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The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly

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The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly

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Dedication

In loving memory of my parents,

Who instilled in me a life-long love of giving,

Who gave me the stamina to overcome difficulties,

And who made me who I am.

Acknowledgements

To anyone else, a bamboo branch might mean nothing more than a branch from any other tree, but for me a bamboo branch has played an important role in my life. When I was eight years old, I came down with rheumatoid arthritis, and for two years I could not walk. As I gradually regained my ability to move about on my feet, my older brothers found a bamboo branch and made it into a cane for me. Only someone who has lost his or her health can understand how important that cane was to me and why, as the years passed, I have always remembered it. Now, after twenty years of nursing, I have adopted a motto for myself: "Do your best to become a cane for your family, your clients, and your community. Be the cane that helps them walk the path of healing and recovery."

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This study used a correlational and cross-sectional research design to identify factors influencing the nutritional status of a sample of elderly Taiwanese. Guiding the study was a conceptual framework that integrated self-efficacy theory and health locus of control theory. Bivariate correlations among the study variables were examined, and hierarchical multiple regression tests were performed to determine whether and to what degree background characteristics, nutrition self-efficacy, and health locus of control predicted nutritional status. Furthermore, the study analyzed and categorized topics identified in the participants' verbal explanations of their eating patterns.

Of the 156 Taiwanese elderly who completed the survey, the majority were healthy males (60.9%) with a mean age of 72.29 years. Relationships among the variables indicated that older people had lower nutrition self-efficacy and nutritional status. Females tended to have higher chance health locus of control. Higher educational levels were related to better nutrition self-efficacy and Mini-Nutritional Assessment scores. Moreover, elderly persons who reported greater health problems and medications had

lower Mini-Nutritional Assessment scores, but had higher albumin levels. The results also showed that, among the elderly, nutrition self-efficacy, internal and chance health locus of control, and nutritional status were interrelated, whereas the powerful-others orientation was not correlated with other variables. Nutritional status, age, educational level, health problems and medications, and chance health locus of control all had effects on the Mini-Nutritional Assessment scores, and only health problems and medications explained significant variances in albumin levels.

In the qualitative portion, a subsample of 58 participants (37.18%) answered an open-ended question about their eating patterns. The analysis of their responses revealed three categories of eating patterns: eating and old age, eating and faith, and eating and family harmony, with each encompassing a number of subcategories.

Generally, the study confirmed the relationships proposed in the research model; however, the overall amount of predicted variance accounted for by the predictors was small, which indicated that unmeasured factors might account for most of the variance in nutritional status. Further research is therefore necessary to gain a deeper understanding of nutritional status and its factors among the Taiwanese elderly.

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CHAPTER 1

INTRODUCTION

The world is aging. The population of older persons has risen dramatically and will continue to grow rapidly throughout the world (Hetzel & Smith, 2001). The population over 65 years of age will increase from 12.5% to 18.2% in the United States, and 7.4% to 10.7% in the world from 2006 to 2025 (U.S. Census Bureau, 2006). Current research reveals that aging is a complex process and a significant number of the elderly experience nutritional problems (Department of Health, 2004; Keller & Hedley, 2002; Larrieu et al., 2004; Sharkey & Schoenberg, 2002). In one study of more than 10,000 elderly persons, for example, the prevalence of malnutrition was 1% to 5% for community-dwelling elderly persons and outpatients, 20% for hospitalized older patients, and 37% for institutionalized elderly patients (Guigoz, Lauque, & Vellas, 2002).

The elderly are particularly prone to inadequate nutritional status because of age-related physiological and psychological changes (Vellas et al., 1999), development of chronic disease, use of medications, and decreased mobility (Chen, Schilling, & Lyder, 2001; Garry & Vellas, 1999). If undetected, nutritional problems among the elderly may result in more rapid deterioration of health and early death. For example, diseases related to dietary intake, including heart disease, cerebrovascular diseases, and diabetes, are major causes of death in the United States and other countries (Department of Health, 2005; Minino, Heron, & Smith, 2006). Furthermore, malnutrition contributes significantly to morbidity and mortality in the elderly (Amarantos, Martinez, & Dwyer,

2001; Wahlqvist & Saviage, 2000). With increased life expectancy and an aging population, more elderly persons will be affected by poor nutrition and related health problems. Moreover, because the aging population is growing globally (U.S. Census Bureau, 2006), escalating health care costs for this population are of concern. Thus, research is needed in order to better understand factors that are related to the health and nutritional status of the elderly population.

Statement of Problem

The population of interest for this study is the elderly in Taiwan, however, statistical information from Taiwan is limited; therefore, statistical data from the U.S. Census Bureau is also used to illustrate important nutritional issues relevant to this study.

Taiwan lies in the heart of Eastern Asia, and comprises islands bordering the East China Sea, Philippine Sea, South China Sea, and Taiwan Strait, north of the Philippines, off the southeastern coast of China. In 2005, Taiwan had a population of 22,770,000 (Department of Household Registration Affairs, M. O. I., 2006). The total land area is 35,980 sq km, making it slightly larger than Maryland, and 1/20 the size of Texas. Taiwan is a developing country and currently, is making a transition from agriculture and traditional labor-intensive industry to a more capital-and technology-intensive industry. For two decades, Taiwan has been a major investor in China, Thailand, Indonesia, the Philippines, Malaysia, and Vietnam. The transition of the society in Taiwan has changed people's life style, and improved the economy and health care services.

There is an increase in the number and proportion of elderly in Taiwan because of the decreased levels of fertility and improved health care resulting in decreased mortality (Department of Household Registration Affairs, M. O. I., 2006). This rapid movement

towards negative growth may cause serious social problems in Taiwan such as an aging population with higher number of chronic illnesses which may burden the health care system (Department of Household Registration Affairs, M. O. I., 2006).

The population of elderly in Taiwan is projected to increase dramatically. For example, data from the U.S. Census Bureau (2006) show that the elderly population in Taiwan increased from 7.8% in 1996 to 9.8% in 2006, and will reach 17.8% by 2025. The increase is reflected by an improved life expectancy at birth from 75.5 years in 1996 to 77.4 years in 2006 (72.8 to 74.7 years for males, 78.4 to 80.5 years for females). Moreover, estimations show that the Taiwanese life expectancy will reach 80.3 years in 2025 (77.5 years for male and 83.4 years for female; U.S. Census Bureau, 2006).

Although longevity has increased, whether the added years of life will be filled with health and vigor or chronic disease and limited functional status or disability is unknown. Good health is a key factor in maintaining an independent and productive life in the elderly. The expected outcome of good health is more than longevity. The goal of longevity is an acceptable quality of life, without debilitating disability. Hence, increases in both the numbers and life spans of Taiwanese elderly produce considerable health care demands. Health professionals in Taiwan must deal with the consequences of these demographic changes, particularly in respect to the health of the elderly population.

Unfortunately, studies of the aging population in Taiwan show that most of the elderly have inadequate dietary intake, insufficient nutritional knowledge, poor nutritional attitude, and poor nutritional status (Department of Health, 2004; Hsu, 2003; Lin & Lee, 2005). Consequently, with longer life spans and increasing numbers, more elderly persons will be affected by poor nutrition and its related health problems. For

instance, in Taiwan, seven out of ten of the leading causes of death in the elderly are related to dietary issues, including, cerebrovascular disease, heart disease, diabetes mellitus, pneumonia, nephritis, nephrotic syndrome and nephrosis, chronic liver disease and cirrhosis, and hypertensive disease (Department of Health, 2005). Thus, nutritional factors underline many elements that contribute to health problems in Taiwanese elders.

As the old Chinese saying "Nothing is more important than eating (民以食為天)" declares (Newman, 2002), food is central to life. Consequently, a way must be found to help older people maintain good nutrition, and thus health, for as long as possible. More research is needed on nutrition in the elderly. By having a better understanding of the factors that relate to the nutritional status of the elderly, interventions can be developed to improve outcomes. Generally, there is a lack of empirical data on the Taiwanese elderly persons, particularly related to nutritional health issues, and the interaction between nutrition and psychosocial factors has rarely been studied. Much of the research has centered on nutrition in the general Taiwanese population, particularly on the relationships between nutrition or micro-nutrient and disease. Although some of the participants in these studies were elderly, most of the studies focused on hospitalized samples. Little research has been reported on the nutritional status and influencing factors specific to Taiwanese community-dwelling elderly. There remains a need for research that focuses on factors that relate to, and predict, nutritional status in elderly Taiwanese. For those reasons, an understanding of health-related behaviors in the elderly is important. An understanding of the determinants of nutritional status in the elderly provides a foundation for effective interventions.

Purpose of the Study

Studies of nutrition in Taiwan elderly indicated poor knowledge of nutrition, insufficient nutrient consumption, and a passive attitude toward the nutrition information which may lead to inadequate nutritional status (Department of Health., 2004). The factors that influence the nutritional status of the elderly are not fully identified and understood. Although some factors that relate to nutritional outcomes have been identified, there are limited studies in the extant nursing literature which explore the relationship among psychosocial variables and nutritional status in Taiwanese elderly. The purpose of this study was to examine the relationships among selected background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, health locus of control (HLC), and nutritional status in the Taiwanese elderly.

Background and Significance

The aging of the population is a great success story but presents society with new challenges. In Taiwan, the demographic trends that reflect dramatic increases in both individual longevity and the proportions of older persons in the populations, are fast becoming both a personal and a social phenomenon. However, in the wake of changing social trends due to modernization of society, there has been growing concern for the welfare and well-being of the elderly. To address this concern, better understanding of factors that are related to the health behavior in the elderly population is needed.

Self-efficacy has been identified as a powerful predictor of health-related behavior (Bandura, 1977a; 1977b). Nutrition self-efficacy, based on Bandura's theory (1977b), is a factor that is related to nutritional outcomes such as better nutritional

attitude (Greene et al., 2004; Matheson, Woolcott, Matthews, & Roth, 1991) and dietary behavior (Conn, 1997). Studies show that an increase in nutrition self-efficacy may be related to better health (AbuSabha & Achterberg, 1997; Baldwin & Falciglia, 1995). Furthermore, many research studies have showed that nutrition self-efficacy is an important factor in predicting nutritional status (Jenkins Reid, 1999; Liou, 2004; Liou & Contento, 2001). Self-efficacy theory is important in predicting health-related behavior, however, it can not provide the whole framework in understanding the factors related to the nutritional status of elderly Taiwanese because Chinese culture affects behavior in a multidimensional way.

The HLC theory is well developed, and it is recognized as essential for the development of self-responsibility for health (Sun & Stewart, 2000). For the elderly population, health experiences and perceptions vary considerably (Armer & Conn, 2001). Thus, because the control beliefs of the elderly may be diverse; a multidimensional view of HLC is important for research with aging populations. Moreover, Chinese persons tend to be concerned about the suggestions of important others, dependent on fate, and accepting of life events as natural processes (Lee et al., 1985; Lin & Liang, 1997; Wong & Piran, 1995). Therefore, the powerful-other HLC (PHLC) and the chance HLC (CHLC) are also important constructs in the study of elderly Taiwanese persons.

Relationships between self-efficacy and HLC have been reported (Waller & Bates, 1992). Wallston and Wallston (1978) argued that perceived self-efficacy is affected by HLC, and/or vice versa. However, a combination of self-efficacy and HLC together might be better predictors of health behavior as opposed to using these concepts separately, because each can provide the information that establishes links between them

(AbuSabha & Achterberg, 1997). Although many studies have been focused on self-efficacy and nutrition and HLC and nutrition separately, their relationships have not been well defined in studies of nutrition in the elderly population. Due to the increasing number of the elderly who are now affected by nutritional issues, the importance of self-efficacy and HLC is paramount. While arguments have been made for the importance of nutrition self-efficacy and HLC, the research literature on the subject presents an incomplete picture regarding the relationships among nutrition self-efficacy, HLC, and nutritional status in Taiwanese elderly. Defining their relationships to each other and their relative importance to the elderly may help practitioners understand individual differences in nutritional status.

Conceptual Framework

To better understand the factors that influence nutritional status in Taiwanese elderly, it is important to employ a model that depicts the complex and multidimensional aspects of the nutritional outcomes. Self-efficacy theory and HLC were used as the conceptual framework to explain the relationships among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status in elderly.

Self-Efficacy

Self-efficacy theory was developed from social learning theory, which posits that behavior is a result of interactions between both personal and environmental variables (Bandura, 1977b). According to social learning theory, behavior is shaped through learning by environmental conditions. In turn, individuals shape the environment. Bandura argued that behavior is not only determined through direct experience, but also through observational or vicarious learning (Bandura, 1977a). By the 1970s, however,

Bandura became aware that a key concept was missing from social learning theory. In 1977, he identified self-efficacy as the missing link (Bandura, 1977b). In an effort to understand and predict behavior, Bandura identified methods by which behavior could be modified or changed. More recently, he further situated self-efficacy within a theory of personal and collective agency that operates in concert with other social cognitive factors in regulating human well-being and attainment (Bandura, 1993).

From Bandura's point of view, self-efficacy refers to the beliefs people have about their own capabilities, in particular, their estimate of personal skill levels and their confidence in their abilities in a particular domain (Bandura, 1977a, 1986). His theory explains how these beliefs are formed, and what effect they may have on performance. Finally, he presented a definitive statement of self-efficacy: "The stronger the perceived self-efficacy, the more likely are persons to select challenging tasks, the longer they persist at them, the more likely they are to perform them successfully" (Bandura, 1986, p.397). According to Bandura (1997), all thoughts affect human functioning, and at the core of social cognition, are beliefs about self-efficacy. Bandura maintains that self-efficacy is the foundation of human motivation, well-being, and personal accomplishment; because, unless people believe that their actions can produce the outcomes they desire, they have little incentive to act or to persevere in the face of difficulties.

Self-efficacy theory is comprised of two primary components: efficacy expectation and outcome expectancy. Efficacy expectation is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1997, p. 2). On the other hand, outcome expectancy, that forms an integral part

of the theory of self-efficacy, represents "a person's estimate that a given behavior will lead to a certain outcome" (Bandura, 1997, p. 2). Thus, efficacy expectations represent judgments of personal competence, while outcome expectations represent judgments of the likely impact of a given behavior.

Self efficacy has been shown to be a powerful predictor of health-related behavior (Bandura, 1977a, 1997). Instilling a sense of self-efficacy is an important adjunct in assisting people to change their behaviors and achieve the highest possible level of health. Research supports a goodness-of-fit between the theory and the empirical evidence (Conn, 1998; Resnick & Nigg, 2003; Strecher, DeVellis, Becker, & Rosenstock, 1986; Tsay, 2003). Nutrition self-efficacy, based on Bandura's theory, may be a significant factor related to nutritional outcomes. Research revealed that an increase in nutrition self-efficacy, resulted in consumption of more fruits and vegetables (Jenkins Reid, 1999), weight loss (Reicks, Mills, & Henry, 2004), and more positive nutrition behaviors (AbuSabha & Achterberg, 1997; Baldwin & Falciglia, 1995).

Evidence supports the ability of self-efficacy predictions: the stronger the belief in their capabilities, the greater and more persistent are their efforts (Bandura, 1989); however, two issues need to be discussed in relation to self-efficacy in elderly populations from different cultures. These issues are aging and self-efficacy and culture and self-efficacy.

Aging and self-efficacy. The current confidence level of an elderly person regarding a task to be performed may not be a good predictor of future behavior (Murphy, Prewitt, Bote, West, & Iber, 2001). The reason is because self-efficacy among the elderly may change due to several factors. These include (a) observation: elderly

people tend to observe other elderly models and when negative behavior is present in the model, negative reinforcement may occur, influencing the elder to engage in the negative behavior (Bandura, 1986); and (b) health condition: observations of chronic disease and loss of independence in elderly peers may lead to lower self-efficacy in elderly because watching others experience disability may affect mastery, e.g., an elder may think that they too, are getting older and should be more sedentary to avoid possible injury or disability (Bandura, 1986). Moreover, according to self-efficacy theory, one's experiences and the interpretation of those experiences can serve to raise or lower efficacy (McDougall, 2004). For example, age-related memory losses may act to lower self-efficacy. Therefore, observation experiences and health conditions may place older populations at risk for reduced self-efficacy.

Culture and self-efficacy. Efficacy beliefs may operate differently depending on the cultural context (Cianni, 1994; Klassen, 2004). Klassen (2004) critically examined 20 studies investigating self-efficacy beliefs through cross-cultural comparisons and found that almost all of the studies showed efficacy beliefs to be lower for Asian samples. Klassen argued that levels of efficacy beliefs tend to be lower in collectivist settings (e.g., Asia), and higher in individualist settings (e.g., the Western countries). The reason may be that individualism promotes self-enhancement and emphasizes self-achievement, while collectivism encourages a tendency for self-criticism and emphasizes social conformity and collective decisions (Mau, 2000). Therefore, as Mau pointed out: "the culture that is individual-oriented is more conducive to fostering self- efficacy, while the collective-oriented culture may have inhibited the development of self-efficacy" (p. 374).

Based on theoretical and empirical evidence related to self-efficacy, aging and culture, it can be deduced that nutrition self-efficacy may play an important role in nutrition behavior and nutritional outcomes in the elderly. However, self-efficacy may not provide a complete framework for understanding the factors related to nutritional status when considering the impact of culture in the elderly population of Taiwan. Other beliefs and actions may affect Taiwanese elderly. For this population, behavior is not only based on belief of behavior capabilities, but is also influenced by other variables such as perceived control (Rotter, 1966).

Locus of Control

Locus of control, which is a construct derived from Rotter's social learning theory (1966), is represented as a generalized outcome expectancy (Wallston, Wallston, Smith, & Dobbins, 1987). The term *locus* refers to the *location* where control resides, either internally or externally (Rotter, 1966), and *control* is the belief that one has at one's disposal a response that can influence the outcome of an event (Thompson, 1981). The theory proposes that behavior depends on the individual's beliefs regarding both the value of the outcome and the perceived probability that particular reinforcement will be at hand. This construct holds that people view the attainment of a particular outcome as either within their control (that is, internal) or outside their control (external). Originally, locus of control was thought of as unidimensional, and it was treated as an individual-differences variable that was stable over time and across situations (Rotter, 1966).

Levenson (1974) argued that locus of control was multidimensional. She calculated that external beliefs could be divided further into two types: (a) control by powerful others, such as family or physicians; or (b) chance expectations, such as fate or

luck. Levenson stated that people who believe the world is unordered (chance) would behave and think differently from people who believe the world is ordered, but controlled by powerful others. Therefore, Levenson introduced three ideas, internal locus of control, powerful others locus of control, and chance locus of control.

Health Locus of Control

A research review (Wallston & Wallston, 1978) showed evidence of a relationship between locus of control and health-related behaviors and thus, the concept of health locus of control (HLC) was introduced. By assessing multidimensional aspects of HLC, researchers increased the probability of understanding and predicting health behaviors. The major concepts of the multidimensional HLC (MHLC) are internal HLC (IHLC), powerful others HLC (PHLC), and chance HLC (CHLC). IHLC represents internality or the extent to which one believes one's health is influenced by one's own actions. PHLC is the powerful other health externalities or beliefs that others control one's health status. CHLC addresses the element of chance as a health externality, that is, the perception that one's health is controlled by fate or luck (Wallhagen, Strawbrige, Kaplan, & Cohen, 1994; Wallston et al., 1987). Therefore, a multidimensional conceptualization of HLC was developed (Wallston, Wallston, & DeVellis, 1978).

The theoretical perspective for the HLC construct is based on Rotter's (1966) social learning theory, which states that persons with strong internal beliefs are most likely to engage in positive health-related behaviors, thereby increasing their physical and mental well-being. In contrast, individuals with external beliefs are not likely to fare as well (Wallston & Wallston, 1978). Many researchers have studied those assumptions, and suggest that individuals with tendencies toward internal HLC, particularly with regard to

physical health, do indeed show higher levels of life satisfaction than those who with tendencies toward external or chance locus of control (Lai & McDonald, 1995; Searle, Mahon, Iso, Sdrolias, & van Dyck, 1995). In fact, there is considerable evidence indicating a significant relationship between HLC orientations and health-related behaviors (Norman, Bennett, Smith, & Murphy, 1998; Speake, Cowart, & Pellet, 1989; Speake, Cowart, & Stephens, 1991; Wallston & Wallston, 1978).

Although many studies focus on the relationship of HLC and health behaviors in Western populations, studies of HLC in the elderly in Taiwan are few. Before applying the HLC to the Taiwanese elderly population, its application to the aging population in Taiwan needs to be conceptualized.

Aging and HLC. Although some studies have indicated a positive relationship between internal HLC and health-related behaviors (Speake et al., 1991; Tuohig, 1991), some authors have argued that the relationship between HLC and health-related behaviors may not be as straightforward as it seems (Murphy et al., 2001).

Lachman (1986), for example, argued that elderly increasingly relegate HLC to chance and powerful others. Factors that may contribute to aging-related changes in the HLC orientation may provide some explanations. Feelings of having less influence over life events may make it difficult to maintain internal HLC (Brothen & Detzner, 1983). Observations of death, illness, and injury among close friends and relatives may also influence the individual's HLC orientation (Goldsteen, Counte, & Goldsteen, 1995). Declining health may produce an orientation toward external causal attributions (Abu-Bader, Roger, & Barusch, 2002; Goldsteen et al., 1995). Decreasing activity and

increasing isolation, as persons become older, may make it difficult to take part in community or social activities (Lumpkin, 1985).

Finally, the ability of the HLC to predict health-related behavior is not as strong in elderly samples, and it presents only a partial picture of control beliefs. It is difficult, therefore, to predict or explain the behavior consequences in the elderly if HLC alone is used. Although perceived control may be a determinant of a behavioral outcome, it may be because perceived control works in conjunction with other constructs or elements such as self-efficacy. Simply put, to achieve a positive behavioral outcome, a person not only needs to believe that the behavior is likely to promote health, but also needs to believe that he or she can perform the behavior (Norman et al., 1998).

Culture and HLC. Cultural background has a particularly strong influence on health-related behaviors among the elderly. Wu, Tang, and Kwok (2002) noted that it is the most salient factor in individuals' perceptions of their environment. For the Chinese people, traditional beliefs of harmony with others, and with nature, are part of life, and those beliefs help them maintain or improve health. The Confucian principle, of harmony, dominates Chinese beliefs. It emphasizes filial piety, the father-son relationship, and a lack of self-centeredness. Thus, a satisfying life is one lived in harmony with one's social environment, the rule of seniority is honored, and people depend on powerful others for guidance (Chae, 1987; Chen, 2001; Guo, 1995). Therefore, value is placed on interdependence, cohesion, and hierarchical modes of relations (Nilchaikovit, Hill, & Holland, 1993). Given those principles, significant others, such as family members and healthcare providers, may be relied on to make healthcare decisions (Wong & Piran, 1995).

Three Chinese philosophies highlight the wisdom of living in harmony with nature. First, Taoism claims that human beings should be in harmony with nature (Y. D. Chen, 1996). The Yin and Yang theory teaches that a peaceful relationship with nature promotes a Yin-Yang balance and leads to health (Chang, 1974; Chen, 2001; Ludman & Newman, 1984). Finally, Buddhist principles advise that life is a mass of ill-fare, with fate being the main factor determining health. Each fate, moreover, is connected to another (Chen, 2001). It is important to always do good and to receive good in return, or else one will encounter bad luck in the future (Y. D. Chen, 1996; Nilchaikovit et al., 1993).

The Chinese culture compels elders to believe that being with others and with nature gives them peace of mind and promotes health; hence, the individual is not distinguishable from the whole (Markus & Kitayama, 1991). Many Chinese, therefore, depend on a key person's opinion and thoughts. They perceive health and disease as natural processes, and they take a fatalistic perspective in their approach to life events (Chen, 2001; Lu & Chen, 2002). In particular, the Chinese tend to believe that outcomes are due to luck, fate, or special favors from important people (Wong & Piran, 1995). They believe further that illness or other mishaps are the result of bad luck or of bad deeds committed in a previous life, and they accept health, illness, and death as part of the normal cycle of life (Nilchaikovit et al., 1993). For those reasons, researchers in Taiwan have shown that the PHLC is positively correlated with patients' compliance (Lin & Liang, 1997), that people tend to have strong family orientations, and that they are likely to endorse external control beliefs (Lee et al., 1985; Wong & Piran, 1995).

In summary, several points relate to the relevance of the HLC for the study of the elderly in Taiwan. First, although aging-related changes in the HLC are still unclear, the MHLC for study in elderly recognizes the possibility of differential control beliefs. Second, the analysis of the Chinese culture indicates that the use of the HLC is appropriate for the study of the Taiwanese elderly because it incorporates the control of powerful others and chance that are deeply rooted in their life beliefs. And, HLC beliefs alone are not strongly predictive of the frequency with which healthy behaviors are performed. It is difficult, therefore, to predict or explain the behavior consequences if the HLC alone is used in the target population. Thus, any application of the HLC in a study of the Taiwanese elderly would have to be considered along with other key variables which may play significant roles in an individual's life and may influence behavior outcomes. Consequently, the addition of other variables, such as, self-efficacy, is suggested.

Research Model

Bandura's self-efficacy theory and the HLC model is the framework for this study (see Figure 1). This framework proposes that nutrition self-efficacy and HLC are related to nutritional status in the elderly. Structurally, the model organizes by four interacting factors: (a) selected background characteristics which include age, gender, educational level, living arrangements, and health problems and medications; (b) nutrition self-efficacy, which represents an individual's conviction or belief that he or she can successfully execute information about healthy diet behavior (Bandura, 1997; Hickey, Owen, & Froman, 1992); (c) HLC, which represents an individual's belief that the source of reinforcement for health-related behavior is primarily internal, under the control of

powerful others, or a matter of chance (Wallston et al., 1978); and (d) nutritional status, which was a point of time of the result of nutritional analysis and biochemical evaluation.

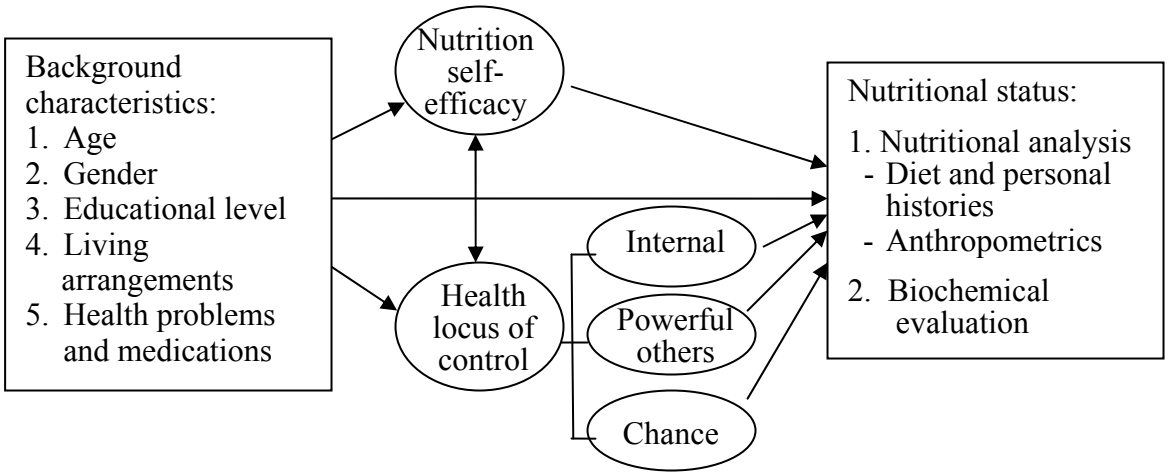


Figure 1. The relationships among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status in the Taiwanese elderly.

Research Questions

Most of the research concerning nutritional issues, self-efficacy, and HLC in Taiwan has been conducted in the context of response to illnesses, rather than in the community-dwelling Taiwanese elderly population. In order to facilitate the understanding of the relationships among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status in the Taiwanese elderly, the following research questions were explored:

1. What is the relationship among background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, HLC, and nutritional status in a sample of Taiwanese elderly?
2. What is the relationship between nutrition self-efficacy and nutritional status in a sample of Taiwanese elderly?
3. What is the relationship among HLC (IHLC, PHLC, CHLC) orientation and nutritional status in a sample of Taiwanese elderly?
4. What is the relationship between nutrition self-efficacy and HLC in a sample of Taiwanese elderly?
5. What is the predictive relationship of background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, and HLC on nutritional status in a sample of Taiwanese elderly?
6. How do Taiwanese elderly describe their eating patterns?

Definitions of the Concepts/Variables under Study

For the purpose of this study, the following definitions were used.

Background Characteristics

The demographic characteristics described the sample background that may influence nutrition self-efficacy, HLC, and nutritional status in the elderly. They were measured by items in the demographic information sheet including age, gender, educational level, living arrangements, and health problems and medications.

Nutrition Self-Efficacy

Nutrition self-efficacy is an individual's conviction or belief that he or she can successfully execute behaviors related to performing healthy diet behavior (Bandura, 1997; Hickey et al., 1992). It was measured by the quantitative score on sixteen items from the Cardiac Diet Self-Efficacy scale (CDSE).

Health Locus of Control

HLC is an individual's belief that the source of reinforcement for health-related behavior is primarily internal, under the control of powerful others, or a matter of chance (Wallston et al., 1978). In this study, the HLC construct was operationalized by the quantitative scores achieved on the eighteen items of the MHLC Scale, including the following subscales: (a) the IHLC; (b) the PHLC; and (c) the CHLC.

Nutritional Status

Nutritional status is a result determined for people based on commonly accepted nutrition assessment parameters (Guigoz, Vellas, & Garry, 1996). The knowledge from the literature reviewed showed that the parameters have been utilized in identifying nutritional status in the elderly including nutritional analysis, and biochemical indices

(Chen et al., 2001; Dwyer, Gallo, & Reichel, 1993; Howard, 1996). To measure nutritional status accuracy, this study contained two methods: (a) the Mini-Nutritional Assessment (MNA) was used to evaluate the nutritional analysis including diet and personal histories, and anthropometrics measurement (Guigoz et al., 1996); and (b) albumin levels were obtained as biochemical indicators of the nutritional status.

Assumptions

The following theoretical and methodological assumptions are made for this study:

1. The elderly Taiwanese are able to understand the questionnaires administered by interview, and the questionnaires are culturally appropriate.
2. The elderly Taiwanese are able to self-assess their background characteristics, nutrition self-efficacy, HLC, and nutritional status by interview.
3. The elderly Taiwanese are able to recall the events of the past 3 months that are related to their nutritional status.
4. The elderly Taiwanese will honestly and accurately answer the interview questions.

Significance for Nursing

The study yields knowledge about the pattern of the relationships among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status among the Taiwanese elderly. Two points are related to the significance for nursing of this study. The first point of significance is the study of the factors that influence nutritional status of the elderly. Because poor nutrition is a preventable health problem for the elderly, information from this study may help health care providers understand how to maintain better nutrition for this population. The second point of significance is the identification

of variables that may be important in the development of intervention nutrition programs to fit the needs of the elderly population. Strategies for examining and identifying nutrition self-efficacy, HLC, and nutritional status may provide in-depth information to help nursing practitioners gain the insights needed to enhance understanding about the factors related to elderly nutritional outcomes. Examining the relationships among those concepts and understanding how do Taiwanese elderly describe their eating patterns can then assist nurses to plan effective interventions to facilitate Taiwanese elderly people toward a healthy eating lifestyle and to maintain healthy nutrition behaviors.

Limitations

The limitations in this study include:

1. The findings from this study may not be generalized to all Taiwanese elderly because of nonrandom population sampling, and because the participants were only drawn from the elderly in Northern Taiwan.
2. Because of the use of a self-selected sample, those who chose to participate in the study may differ in some way from those who did not.
3. Participants in this study are more likely to be independent because they are community-dwelling. By contrast, elderly who are frail, isolated, and with little or no access to the public health center were not represented in this study.
4. Some research instruments used in this study were developed in English and based on western data. The validity of the translation might be compromised because some English words could not be easily translated to Chinese.
5. Self-report questionnaires rely on the participants' ability and accuracy to reflect on behavior. This procedure may result in responses that are biased by social desirability.

Transient personal factors, such as fatigue and attention span, and situational factors, such as distraction, may result in measurement error.

6. The researcher reported participants' albumin levels from their 2007 health evaluation data sheet; hence, albumin time of measurement was variable (from 1 week ago to 3 months ago) thus may result in bias for this data.
7. No causal mechanisms can be identified because an experimental design was not used.
8. The cross-sectional research design can not show changes in nutrition self-efficacy, HLC, and nutritional status over time.
9. Conducting face-to-face interviews where the researcher had to explain the questions for the participants might have influenced responses.
10. The information obtained from the qualitative data may have some bias because the short answer question was asked at the end of a long and potentially tiring survey, and respondents' answers were possibly influenced by the previous questions. Moreover, note-taking during interview may have been a bias as opposed to tape recording.

Summary

The purpose of this study was to examine the relationships among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status in the Taiwanese elderly. This chapter presented the background and significance of the study emphasizing the prevalence and influence of factors relating to nutritional status in the elderly. The purpose of the study was outlined, and the research questions were identified. The conceptual framework was presented, and the hypothesized theoretical links between self-efficacy, HLC, nutritional status, and background characteristics were reviewed. Based on the conceptual framework, concepts/variables using in this study

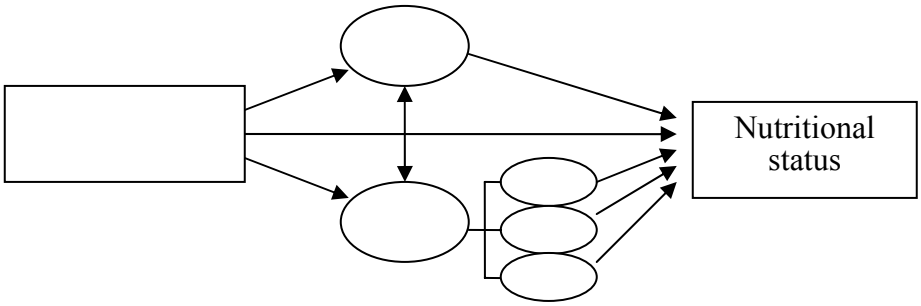
were defined. Four assumptions that related to this study were listed. Finally, the findings of this study may assist nurses and other health professionals to learn more about factors contributing to the nutritional status the elderly in Taiwan, and the results may provide a basis for nurses and other health professionals to design appropriate and suitable interventions for Taiwanese elders.

CHAPTER 2

REVIEW OF THE LITERATURE

An initial step in exploring the relationships among nutrition self-efficacy, health locus of control (HLC), and the nutritional status of the Taiwanese elderly is to review the results of previous research. This chapter, therefore, is a review of the literature in five sections. The first section presents research on the nutritional status of the elderly, a variable that represents the main outcome of the model presented in the current study. The second section addresses self-efficacy and nutritional behavior among the elderly. The third section discusses the HLC concept as it applies to nutritional behavior, and the fourth section is a review of research on the relationship between self-efficacy and HLC. The final section is a discussion of background characteristics influencing nutritional status among the elderly. Most of the reviewed studies are directed specifically at the elderly. Note, however, that only limited research has focused on factors unique to the experience of the Taiwanese elderly. For that reason, the studies reviewed in this chapter have been selected largely from the research literature of the West.

The Nutritional Status of the Elderly



The studies reviewed in this section are those that help us understand the nutritional status of the elderly. First, the section provides an overview of research supporting the importance of nutrition and health, especially as they relate to aging. Of particular interest are studies addressing the nutritional status of the elderly in Taiwan. The section then identifies factors that may be antecedent to nutritional status among the elderly.

Nutrition and Health

Nutrition partially determines physical and psychosocial health. *Nutritional status* is based on commonly accepted nutrition assessment indicators (Guigoz at al., 1996). According to those indicators, which are usually explained to the individual when the nutritional assessment is completed, the individual is assessed as having a normal or an inadequate nutritional status. The terms frequently used in the literature for inadequate nutritional status are *undernourishment*, *malnutrition*, *protein energy undernutrition*, *protein calorie deficiency*, and *nutritional risk*. In the health of the elderly, malnutrition is the most serious concern (Rauscher, 1993). *Malnutrition* has been defined as a disturbance of form or function because of a lack or excess of calories or one or more nutrients (McCormack, 1997). Malnutrition, therefore, includes (a) undernutrition resulting from insufficient food intake, (b) overnutrition caused by excessive food intake, (c) specific nutrient deficiencies, and (d) imbalance because of disproportionate intake (Keller, 1993b; McCormack, 1997).

Nutrition and health are closely linked; in fact, both dietary intake and nutritional status affect one's lifespan and life expectancy. In a national cohort study from 1987 to 1992 (N = 10,084), Kant, Graubard, and Schatzkin (2004) examined the relationship

between eating patterns and mortality. The results showed that dietary patterns that included foods and behaviors recommended by established dietary standards (fruits, vegetables, whole grains, low-fat dairy foods, and lean meats or alternatives) were associated with a lower risk of mortality at a follow up 5.9 years later. The researchers estimated that 16% and 9% of the mortality from any cause among men and women, respectively, could be eliminated by the adoption of desirable dietary behaviors.

Good nutrition also promotes health-related quality of life. In a study of persons aged 60 years and above who were participating in a meal program (N = 155), Vailas, Nitzke, Becker, and Gast (1998) found associations between health-related quality of life and factors commonly linked to malnutrition. The results showed that nutritional risks, food insecurity, and decreased enjoyment of food were all negatively associated with health-related quality of life. The results were consistent with those of more recent studies. For example, Keller (2004) conducted an interviewer-administered survey among frail elderly persons (N = 367) to determine whether a relationship exists between nutritional risk and health-related quality of life. According to the results, nutritional risk appears to be a significant and important factor in achieving health-related quality of life. Finally, Cassidy et al. (2004) conducted a study to explore any association between nutritional outcome and health-related quality of life among community-dwelling women aged 70 years and over (N = 278; M = 74.6 years). The findings showed that persons with higher body mass indices (BMIs) had significantly lower scores on their health-related quality of life measures and that higher BMI was related to depression.

Healthy eating is an important factor in the prevention of illness. To examine the relationship between diet quality and chronic disease, McCullough et al. (2002) recruited

a total of 38,615 men and 67,271 women. The researchers found that diets of higher quality were associated with significant reductions in the risk of major chronic disease both in men and in women.

To summarize, nutrition remains important throughout one's life. Many chronic diseases develop late in life, but good nutrition in the later years contributes to the maintenance of health and quality of life, which are essential for longer life, prevention of dietary deficiency diseases, promotion of optimal functioning, reduction of premature mortality, and compression of the period of morbidity at the end of life.

Aging and Nutrition

A number of studies have examined nutritional health within elderly populations, and many found that poor dietary habits and inadequate nutrient intake among the elderly should be of great concern to health professionals. For example, Marshall, Stumbo, Warren, and Xie (2001) investigated the relationships among dietary habits, nutrient intakes, and nutritional risks in community-dwelling and rural elderly ($N = 261$, $M = 85.2$ years, $SD = 3.9$ years). The results showed that 60% of the subjects did not meet their estimated needs for nutrients.

Some studies have interpreted data in attempts to explain why elderly people do not consume adequate daily amounts and varieties of food. To this end, AbuSabha et al. (1997) conducted a study of rural older women ($N = 180$) to identify factors that may contribute to variety in diet and variability in weight status. The results indicated that the variety of diet and the number of meals explained 36% of the variation in calorie intake. In that study, BMI was related to a number of factors, including adherence to a weight-loss diet and diagnosis of hypertension. Therefore, the authors concluded that diet variety

and the number of meals during the day were two important parameters in the nutritional screening of older adults and may be useful for identifying populations at nutritional risk.

Likewise, Sharkey et al. (2002) found that skipping meals, especially breakfast, was a factor that influenced nutritional outcomes among the elderly. The researchers found that breakfast was an important meal for the elderly persons in the study ($N = 345$). Individuals who skipped breakfast were found to have inadequate intakes of specific dietary components, including calories, protein, and many nutrients.

Keller and Hedley (2002) examined nutritional risk and nutritional problems among the elderly (N=247). According to their survey, 56.7% (n = 140) of the respondents were at nutritional risk and experienced common problems, such as significant weight change in a six-month period; low intake of fruits, vegetables, and milk products; and restriction of diet for health reasons.

In the few studies of older populations in Taiwan, most researchers concluded that the Taiwanese elderly have inadequate dietary intake and poor nutritional status. The Department of Health in Taiwan (2004) investigated the nutritional status, nutritional knowledge, nutritional attitude, and nutritional behavior of 2432 elderly subjects. The results identified a number of factors contributing to poor nutritional status: (a) nutrient insufficiencies in fiber, vitamin B6, vitamin E, and calcium, and excessive intake of sodium; (b) a high prevalence of obesity among the elderly, especially elderly women; (c) insufficiency in nutritional knowledge, especially of the relationship between nutrition and health; and (d) a high prevalence of nutrition-related health problems, including hyperuricemia, hyperglycemia, and hypercholesterol.

Another study of Taiwanese elderly persons (N = 1873) investigated nutritional status in relation to the nutritional knowledge, attitudes, and behaviors of the participants, as well as factors affecting their dietary quality (Lee, 2002). The nutrition attitude included healthy food selection, healthy eating, and traditional Chinese food taboo attitude (for example, too hot or too cold). The results were similar to those of the previous study; that is, the participants' nutritional knowledge was poor, their nutritional attitude was fair, and for 40% of the participants, overall dietary quality was not satisfactory.

Consistent with those results were the findings of Hsu (2003), who reported that a large number of elderly in Taiwan were at risk for malnutrition. Hsu investigated the relationship among nutritional status, living functions, and cognitive function of elderly persons (N = 200). Factors affecting the nutritional status and malnutrition prevention were also examined. The results indicated that the percentage of obesity was more than one quarter (26%) of the sample, the risk of malnutrition was high (24.5%), and the proportion of malnourished was 2%.

In contrast to the studies reviewed above, other authors have argued that the aging process alone has no significant adverse consequences for food intake and nutritional status among the elderly (Casper, 1995). One research team examined prospective changes in food habits and nutrient intake in a representative sample of community-dwelling adults aged 70 years and over (Ernyhough, Horwath, Campbell, Robertson, & Busby, 1999). To distinguish age, time, and cohort effects, the 6-year study collected and analyzed longitudinal, cross-sectional, and time-sequential data. The cross-sectional analysis showed that weight decreased and calories intake increased with advancing age.

The time-sequential and longitudinal analyses showed a similar pattern in that the percentage of calorie intake increased, suggesting a time effect. The researchers, however, found no indication of an age effect on nutrient intake. Moreover, the elderly people in the study tried to shift their diet toward healthy food, for example, from saturated fats to unsaturated fats and from whole milk to lower-fat milk. In addition, the study found an increase with age in the proportion of participants who ate breakfast cereals at least once a week. Regular and occasional use of vitamin and mineral supplements also increased over the 6-year period.

Results of other studies were consistent with those of Ernyhough's team (1999). Vetter (1990) compared two groups of fit elderly persons with a sample of younger individuals in terms of dietary habits, attitudes, and beliefs. The results indicated that the elderly persons knew as much as the younger persons about what constituted a healthy diet.

One study evaluated nutritional knowledge of and attitudes toward food and nutrition among 64 noninstitutionalized elderly persons and examined the relationships of the knowledge and attitudes to actual dietary behavior. Behavior, in this study, was measured as nutrient intake and the purchase of healthy foods and vitamin/mineral supplements. The results showed that the mean nutrient intake was satisfactory (Grotkowski & Sims, 1978).

Callen and Wells (2003) conducted a study to examine the aids and barriers to nutritional health among community-dwelling elderly persons ($N = 68$). In general, these participants talked more about life elements that facilitated good nutrition rather than barriers that worked against it. In the interviews many participants said they had grown

up thinking they had to eat everything on their plates and they had carried that attitude into old age. The results of the study indicated that the participants believed they were doing well nutritionally.

On the whole, the literature indicates that many elderly persons have insufficient nutrient intakes. Empirical data clearly suggests that the nutritional status among Taiwanese elderly is inadequate. Some authors, however, argue that the aging process alone has no significant impact on food intake and the nutritional status of elderly individuals. Clearly, aging is a complicated process. If health programs are to succeed in the improving nutritional status within groups of the elderly, such as those living in Taiwan, researchers must learn more about the factors within those groups that are antecedent to poor nutritional status.

Antecedents to Malnutrition in the Elderly

The relationship between the aging process and nutritional status is complex, but several age-related factors are known to predispose an elderly person to a decline in nutritional status. For example, a loss or decline in physiological functioning can adversely affect appetite and food intake. Whereas the causes of lowered food intake among the elderly are multiple, four factors have received particular interest in the literature. They are a decline in sensory functions, oral health problems, chronic disease, and polypharmacy. Those factors may affect the ability of the elderly to shop for, select, prepare, and sometimes even eat food.

Loss of sensory functions. People enjoy food because it appeals to their sense of taste and smell. Unfortunately, as people grow older, their senses begin to fade, and that gradual loss of sensory response has a negative impact on food intake. Many studies have

shown that, compared to younger individuals, the elderly have greater difficulty detecting sweet, sour, salty, or bitter compounds (Hall & Brown, 2005; Rainey, Mayo, Haley-Zitlin, Kemper, & Cason, 2000). One study assessed the relationship between impaired taste and smell perception and eating behaviors among 89 elders aged 70 and above living independently in a community. The results showed that a poor performance on sensory tests was related to poor appetite, fewer feelings of hunger, and subjectively poor taste and smell perception (de Jong, Mulder, de Graaf, & van Staveren, 1999). Poor vision may also affect the eating behaviors of the elderly, because their reduced ability to read labels may place limits on their grocery shopping and their ability to select healthy foods (Elbon, Johnson, Fischer, & Searcy, 2000).

Oral health problems. Oral health problems include problems with mastication and salivation. A reduction in masticatory ability may result in poor nutrition or in shifts to different foods and eating patterns. In support of this view, studies have found that elderly subjects with impaired dentition consistently had lower healthy-eating scores, consumed fewer servings of fruits, and had lower total calorie and protein intake than those with better dentition (Hsu, 2003; Sahyoun, Krall, & Lin, 2003; Sahyoun, Serdula, & Zhang, 2005; Yoshihara, Watanabe, Nishimuta, Hanada, & Miyazaki, 2005). In a study to determine the prevalence of malnutrition in long-term-care elderly, Keller (1993a) found poor dentition in 44% of participants (200 elderly patients comprising 166 male and with a mean age of 78.5 years). The results suggested that dentition problem led to slow eating, low protein intake, poor appetite, and dysphagia in regard to solid foods.

A reduction in salivary secretions and complaints of oral dryness could be signs of poor nutrition. One study investigated the relationship between symptoms and signs of

oral dryness and malnutrition in hospitalized older people, in this case, a cohort of 99 elderly persons (M = 82.5 years, SD = 4.0 years) (Dormenval, Budtz-Jorgensen, Mojon, Bruyere, & Rapin, 1998). The results showed that loss of appetite was present in 54%, and 51% complained of oral dryness. In addition, significant associations were found between complaints of oral dryness, loss of appetite, and low BMI. Moreover, the participants complained of oral dryness and reduced salivary flow rates, both of which had a negative effect on alimentation, appetite, and oral comfort. Those conditions could create difficulties in chewing and swallowing, and indeed one study found that most subjects (54%) reported some difficulty with chewing, swallowing, or mouth pain (N = 345), any of which could be expected to influence nutritional status (Sharkey et al., 2002).

Chronic disease. As is well recognized, advancing age is associated with a higher incidence of chronic illness and increasing signs of malnutrition. This association, along with the treatments required for chronic diseases, results in decreased mobility, which in turn leads to a diminished ability to shop for and prepare food. As Hsu (2003) pointed out, nutritional status is positively correlated with the functions of ordinary living. Moreover, a number of diseases an older individual may suffer can alter appetite, produce malabsorption, increase metabolism, and incur nutritional risks (Eveleth et al., 1998; McCullough et al., 2002). Several researchers have linked chronic disease and their symptoms to increased nutritional problems. For example, Callen and Wells (2003) examined barriers and aids to the maintenance of the nutritional health among a sample of community-dwelling elderly (N = 68, M = 86.0 years, SD = 4.4 years). The authors found that the main barriers included health problems and difficulties with transportation.

On the other hand, higher functional status was linked to important aids for the maintenance of nutritional health. This result was consistent with that of Gustafsson et al.'s study (2002), which found that women with perceived disability in food-related activities tended to have lower calories intakes than women without such a disability (N = 52).

Medications. As average life expectancy increases, so does the number of persons receiving long-term drug therapy. Chrischilles et al. (1992) examined the relationship between age and medications use, as well as the prevalence of prescription and nonprescription medications use, in a group of community-living elderly. The results revealed that prescription drugs were used by 60-68% of the men and 68-78% of the women; nonprescription drugs were used by 52-68% of the men and 64-76% of the women. Moreover, the use of prescription medications generally increased with age. The study also found that with up to 10% of the older population taking five or more medications, the older population used three times as many drugs as younger populations and accounted for 25% to 30% of all prescription drug use. Regarding the types of medications, analgesic and cardiovascular drugs represented the greatest percentages of use among both men and women (37% for men, and 52% for women), and gastrointestinal agents yielded at least 9% of use among men and 11% among women.

The elderly are at greater risk for adverse drug reactions and drug-induced malnutrition (Ham, 1992). Nutrition deficiencies associated with a high and continual intake of drugs can result from decreased nutrition intake, malabsorption through a loss of the integrity of the intestinal brush, urinary hyperexcretion of nutrients, increased nutrient catabolism, or impaired nutrient utilization (Roe, 1985). Moreover, the ingestion

of multiple drugs increases the possibility of interaction effects, side effects, decrease in sensory perception, and reduced appetite (de Jong et al., 1999; Lipschitz, Ham, & White, 1992). Consequently, drugs may cause anorexia severe enough to cause a marked reduction in food intake and hence nutrient intake, with the subsequent risk of nutritional deficiency (Roe, 1985). To examine the relationship between medications and nutritional status in the elderly, a study of 90 elderly persons attending the falls clinic showed that 41 of the 90 participants were assessed as having high nutritional risk (Stolz et al., 2002). The most common risk factor was the daily ingestion of three or more different medications.

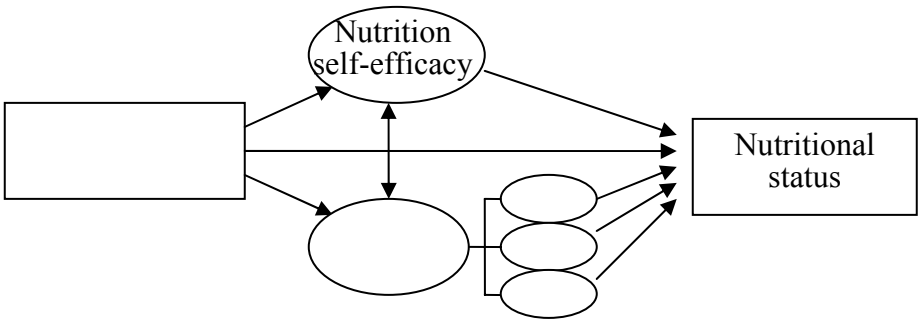
Simply put, the foregoing studies suggested that nutritional status in old age has multiple factors, or stated differently, nutritional outcomes in elderly persons have many antecedent factors. The loss of sensory perception may impede an elderly person in maintaining the desire to eat and enjoy food; oral health, including dentition dysfunction and oral dryness, can create difficulty in chewing and swallowing; and a history of disease may decrease mobility and reduce the ability to shop for and prepare food and thus become a main reason for the failure to maintain nutritional health. Finally, the elderly are at greater risk of adverse drug reactions and drug-induced malnutrition, because medications decreases nutrition intake and catabolism, increases malabsorption and hyperexcretion of nutrients, and impairs nutrient utilization.

Summary

The conclusion common to the different studies on the nutritional status of the elderly is that good nutrition may be related to longer life span, better health-related quality of life, and prevention of illness. Most researchers find that the elderly tend to

have poor dietary habits and inadequate nutrient intake, but a few authors argue that the aging process alone has no significant impact on food intake and the nutritional status of elderly individuals. The differences of nutritional status among the elderly may be related to multiple factors. For example, a decline in sensory function, oral health problems, chronic disease, and polypharmacy all have an adverse impact on nutritional outcomes. Overall, however, the nutritional status of elderly persons appears to be a complex and multidimensional concept. Many inconsistencies are found in the various attempts to determine the nutritional status of the elderly. To understand the many aspects of nutritional status, researchers must delve deeper into the physiological changes and psychological factors of aging and nutrition.

Self-Efficacy and Nutritional Status



Based on a review of nutritional status literature, the relationship between the elderly and nutritional status is complex; however, self-efficacy is a valuable factor that may help investigators to understand health-related behavior.

Self-Efficacy and Nutritional Behavior in the Elderly

According to self-efficacy theory (Bandura, 1997), nutritional status can be predicted by perceptions of nutrition efficacy. For example, Matheson et al. (1991) tested a theoretical model based on Bandura's theory that predicted self-efficacy towards

nutritional behaviors in a sample of 132 noninstitutionalized older adults. The data, which were collected by personal interviews, revealed direct relationships between self-efficacy and the attitude that nutrition was important, and between self-efficacy and flexibility towards changing one's nutrition practices.

Similarity, Conn (1997) examined the ability of self-efficacy expectation and outcome expectancy to predict health behaviors, specifically, exercise, nutrition, and stress management, among older women living in a community-dwelling. After interviewing women aged 65 to 92 years *(N* = 225), the researchers found that self-efficacy was the strongest predictor of dietary behavior (β = .50). Because the population included only women, however, those results have limited generalizability.

The transtheoretical model was used to examine the relationships among aging, nutritional behavior, and nutrition self-efficacy of 201 elderly (*M* = 74.1 years, *SD* = 3.22 years, female = 64%) (Jenkins Reid, 1999). Participants were divided into two groups: high and medium physical function. The analysis revealed that the high-function group had greater self-efficacy for eating five or more fruits and vegetables most days than the medium function group. In addition, the study indicated that self-efficacy was related to stage of change; for example, elderly participants who reported higher self-efficacy had tried to increase their fruit and vegetable consumption.

In a similar study (Greene et al., 2004), also based on a transtheoretical model, the relationship between self-efficacy and eating of five servings of fruits and vegetables per day was explored. The participants were 1253 community-residing individuals 60 years or older (*M* = 75.4 years, *SD* = 8.5 years), the majority were women (70%) and White

(78%). The results showed that progression from contemplation/preparation to action/maintenance was associated with substantial increases in self-efficacy.

All studies presented above were cross-sectional designs; therefore, they were measures of constructs at only a single point in time. In a more comprehensive study, Rimal (2000) used both a cross-sectional and longitudinal approach to explore the predictability of nutrition self-efficacy for nutritional behavior. The authors collected cross-sectional data in three waves during a 10-year period (N = 2055, 2026, and 2068 at baseline, Year 6, and Year 10, respectively), and they collected longitudinal data in two waves during a 4-year period (N = 1384 and 1151 at Year 2 and Year 4). The data were collected at the Stanford Five-City Project from participants who were aged 21 years and older. Measures were taken of three factors: dietary behavior, dietary knowledge, and diet self-efficacy. The results of both the cross-sectional and longitudinal studies revealed that the correlation between dietary knowledge and dietary behavior was greater among those with higher levels of self-efficacy. The results indicated that higher dietary self-efficacy increased with dietary knowledge-behavior over time.

Self-Efficacy and Health-Related Behavior in Taiwanese

In Taiwan, little research has been conducted on the relationship between nutrition self-efficacy and nutrition behaviors among the elderly. Of the few studies reported, many were conducted with middle-aged people with illnesses. For example, Wang, Wang, and Lin (1998) evaluated glycemic control and other factors affecting outpatients with diabetes. By purposeful sampling, the researchers collected data from 130 participants. The results of the study indicated a strong negative correlation between self-efficacy and HbA_1C and a positive relationship between self-efficacy and diabetes

self-care behaviors. In a similar study, Chen, Chang, and Lin (1998) investigated the relationships among self-efficacy, social support, and self-care behaviors for Taiwanese diabetes patients. Interviews with 66 diabetes patients at a medical clinic revealed that self-efficacy was the strongest predictor of self-care behaviors.

Chen, Liang, Lee, and Lu (1999) investigated the relationship between the effects of nutrition intervention and dietary self-efficacy in a sample of 112 older adults with hyperlipidemia living in Taiwan. After three months, the researchers found that dietary self-efficacy was positively related to the intervention outcomes. Participants who showed an increase in dietary self-efficacy also showed improvements in their lipid-control knowledge and behaviors. In addition, the increase in self-efficacy was associated with better blood-lipid profiles and decreased body fat composition. The results were consistent with those of Lin, Liu, Chen, and Liu (2001), who evaluated the relationship between self-efficacy and a fat-intake-reduction education program for adults living in Taipei City (N = 51). The results of that study indicated that higher self-efficacy was significantly related to better dietary behavior.

One interesting study examined self-efficacy as a possible factor in the decision of elderly persons to move to communities for elders (N = 147). The results showed that self-efficacy negatively correlated to the participants' perception of themselves as relying on their children and disrupting their children's lives. On the other hand, elderly persons who had lower self-efficacy tended to perceive themselves as relying on their offspring (Teng, Wong, Chiou, & Lo, 2006).

Finally, one study addressed the influence of culture on self-efficacy and nutritional behavior. Liou (2004) hypothesized that self-efficacy is positively associated

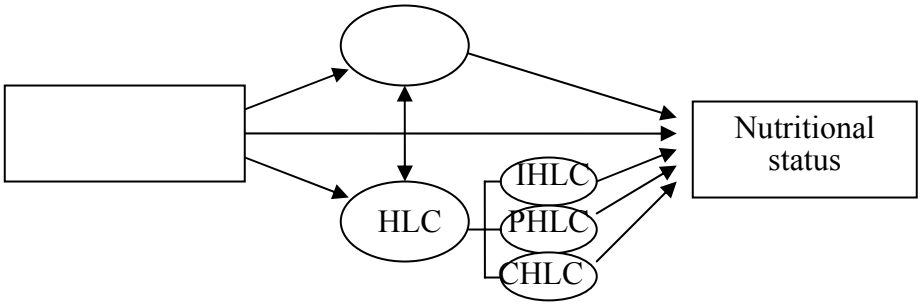
with fat-related dietary behavior within a sample of first- and second-generation Chinese Americans living in New York City. For this study, *first generation* was defined as individuals born in mainland China ($N = 600$) and *second generation* as those born in the United States ($N = 143$). The ages ranged from 21 to 73 ($M = 36.0$, $SD = 11.2$). The results indicated that self-efficacy was significantly related to eating habits for the entire sample ($r = .36$, $p < .01$). An important finding, however, was that the second-generation group received higher dietary self-efficacy scores than their first-generation counterparts. This study was a unique examination of the role of self-efficacy in the prediction of fat-related dietary behavior, for it compared two groups of the same ethnicity but with difference living experiences. In doing so, the study revealed wide differences in social, cultural, and civic organizations between immigrant and native Chinese.

Summary

Studies were consistent in showing a positive relationship between self-efficacy and nutritional behavior and between self-efficacy and health behaviors in general. Older adults who maintained good nutritional practices, exhibited good dietary behavior, or ate adequate amounts of fruits and vegetables also showed higher levels of self-efficacy toward improving their nutritional behavior. Moreover, the positive effect of self-efficacy on nutritional behavior persisted over time. The majority of the participants of these studies, however, were from Western populations and of high socioeconomic status. Similar studies of Taiwanese elderly persons from lower socioeconomic backgrounds would be expected to yield different results. Unfortunately, most research focusing on the Taiwanese elderly population did not give attention to the association of nutrition self-efficacy and nutritional behaviors among the well elderly. Instead, the research tended to

focus on general age groups with illness-related behaviors, although the findings were consistent with research from other countries, namely, that self-efficacy was significantly related to health-related behavior. Moreover, from the research reviewed, different types of social, cultural, and civic organizations showed different relationships between self-efficacy and nutritional behavior. Consequently, studies exploring the effect of nutrition self-efficacy on nutritional status among community-dwelling elderly living in Taiwan are still needed.

Health Locus of Control and Nutritional Status



Considerable evidence in the literature suggests a significant relationship between HLC and specific health outcomes. Because studies on HLC and elderly nutritional behavior are quite limited, investigations of HLC in adult populations related to nutritional status are reviewed in the following sections.

HLC and Health-Related Behavior

In Europe, Wardle et al. (1997) conducted an international comparison study to examine five healthy dietary habits reflecting HLC. A sample of 16,485 students with a mean age of 21.3 years was recruited from 21 European countries. Data were collected in two rounds, the first from 1989 to 1990 and the second from 1991 to 1992. Across the sample, men had higher scores than women on internal HLC (IHLC) and powerful others

HLC (PHLC). The IHLC scores showed a positive correlation with healthy dietary practices (r = .09, p < .05), chance HLC (CHLC) scores showed a negative correlation with healthy dietary practices (r = -.10, p < .05), and the correlations between PHLC and healthy dietary practices indicated no discernable relationship (r = .01, p > .05). The sample was recruited from universities, the participants were young, well-educated, and more likely to come from more privileged social backgrounds; therefore, caution is necessary in generalizing the results to other populations.

Studies have examined HLC as a predictor of health-enhancing behaviors and avoidance of health-compromising behaviors in the general population. For example, Norman et al. (1998) tested the hypothesis that individuals who believe that they have control over their health will be more likely to engage in health-enhancing behaviors and avoid health-compromising behaviors. For that study, a representative sample of 11,632 people ranging in age from 18 to 64 years completed a questionnaire measuring HLC, health values, and a number of health-related behaviors (smoking, alcohol, exercise, and diet). The results showed that those engaging in more healthy behaviors scored higher in the IHLC dimension and scored lower in the PHLC and CHLC dimensions.

Other investigators also demonstrated positive associations between health-related behavior and HLC. Hayes and Ross (1987) examined the relationships among health beliefs, HLC, and eating habits in adults. By using random-digit dialing to conduct a telephone survey, the researchers recruited 401 participants ranging in age from 18 to 83 years. The results showed that people with higher IHLC had better eating habits. In contrast, people with an external HLC did not believe they were responsible for or in control of their health.

The relationship between HLC and health-related behaviors may not be as straightforward as it seems. For example, a study conducted by Wallston, Wallston, Kaplan, and Maides (1976) failed to find significant differences in weight reduction between individuals with internal and external HLC orientation. The participants for that study were 34 overweight women with a mean age of 21. Subjects whose HLC scores matched were randomly assigned to one of two weight-reduction programs: a self-directed program (internally oriented) or a group program (externally oriented). After eight weeks, an analysis of variance failed to yield any significant main or interaction effects. On the other hand, the externally oriented participants in the group program lost more weight than those in the self-directed program, and the internally oriented participants in the self-directed program lost more weight than those in the group program. The small sample size, however, may have affected the results of the study.

The review of the literature indicates that HLC is associated with health-related behavior. For example, people with higher IHLC practice present more positive health behaviors; however, some researchers did not find a relationship between HLC and health-related behavior. Therefore, empirical evidence relating HLC to health-related behavior is incomplete.

HLC and Health-Related Behavior in the Elderly

Lachman (1986), the researcher who first raised questions about HLC and aging, tested whether or not locus of control beliefs change in later life. In three studies, Lachman measured generalized locus of control and domain-specific locus of control (intelligence and health) within independent samples of young and elderly adults. The young adults were college students recruited from an introductory psychology class. The

elderly adults were community-residing volunteers from senior citizen organizations. The sample sizes for the young adults in the three studies were 100, 51, and 37; for the older adults they were 96, 48, and 48. The results showed that the elderly were more external on domain-specific locus of control, and those elderly with a stronger belief in powerful others' control over health, visited the doctor more frequently. Lachman suggested, therefore, that, as the elderly confront the increasing likelihood of illness and death, as well as a lack of power in the social, economic, and political spheres, they increasingly relegate locus of control to chance and powerful others, primarily because they must increasingly depend on assistance. Internal control, on the other hand, is not as likely to be affected by aging, because the aging individual comes to know his or her own capabilities and limitations and, possibly, learns to compensate for them.

To examine how HLC affects health-related behavior among the elderly, many researchers have explored the relationship between HLC and health-promoting lifestyles in the aging population. For example, Tuohig (1991) carried out a study to examine the relationship between HLC and healthy lifestyles (N = 275, M = 65.8 years, SD = 3.6 years). The majority of the participants were Anglo (98.2%), married (77.5%), living with their spouse (77.5%), and had high educational levels. The results indicated that the community-dwelling elderly persons with strong PHLC or CHLC did not take responsibility for their health behaviors and consequently had poorer scores on all of the health-promoting subscales. In contrast, those elderly individuals with IHLC were found to accept greater responsibility for their health and to engage in more health-promoting lifestyle activities.

Tuohig's (1991) research findings supported those of Speake et al (1989). This earlier study was an examination of the relationships between HLC in the well elderly (N = 297) and six aspects of a healthy lifestyle (nutrition, exercise, stress management, self actualization, health responsibility, and interpersonal support). The results indicated that higher IHLC scores were associated with higher scores on the exercise, nutrition, stress management, health responsibility, and self actualization subscales. Moreover, the study found that higher education levels were associated with higher IHLC scores and that subjects with less education had higher PHLC and CHLC.

Two years later, two of the same researchers conducted a study to compare healthy lifestyles and HLCs in two groups *(*N = 343): the elderly who lived in rural areas (n = 106) and the elderly who lived in urban areas (n = 237) (Speake et al., 1991). The results were similar to those of the previous study in that HLC was independently predictive of two or more healthy practices. In addition, IHLC predicted better nutritional practices, and CHLC predicted poorer nutritional practices. Moreover, compared to the urban elderly, the rural elderly were more likely to have lower incomes, less education, worse perceptions of health, and stronger beliefs of PHLC and CHLC.

In a similar study, Millard (1998) investigated health-promoting behavior and its correlation with HLC among community-dwelling adults aged 65 years and over (N = 255; M = 76.9 years, SD = 7.1 years). The results showed that the participants were in disagreement about the degree to which powerful others were in control of their health. In contrast, they were in moderate agreement about the degree to which they themselves were in control of their health. Moreover, those in the sample who had higher IHLC scores also participated more frequently in health-promoting behavior (r = .25, p < .01).

In this study, educational level, perceived health status, perceived IHLC, and perceived social control of health behavior had significant positive correlations with frequency of engaging in health-promoting behaviors.

In another study of nutritional behavior, Kim, Reicks, and Sjoberg (2003) investigated the relationship between HCL and the intention to consume dairy products (N = 162; M = 75.0 years). The participants were mostly women (76%) and White (65%), and about half had not completed high school. The results indicated that perceived behavioral control is independently associated with dairy product consumption. More recently, the same research team attempted to identify determinants of HLC in vegetable intake among older adults (N = 205, M = 77.0 years) (Sjoberg, Kim, & Reicks, 2004). Most of the participants were women (74%), White (77%), and had 12 years of education. Regression analyses showed that perceived behavioral control was an important factor in explaining both intention to consume more vegetable and the actual intake of vegetables.

Not all nutrition-related studies, however, have found a relationship between dietary behavior and HLC in the elderly. For example, Murphy et al. (2001) conducted an intervention trial (N = 101, M = 65.0 years) to determine the relationship between HLC and diet changes within the sample. The majority of participants were White males who were well-educated and married. The results showed that the IHLC did not predict diet change; however, there was an unequal number of participants in the two groups (68 vs. 43), and the population came from a single veterans' hospital. Those two factors tend to compromise the generalizability of the study results.

The literature shows that the elderly tend to have an external orientation in domain-specific locus of control. Many researchers are interested in examining the relationship between HLC and health-promoting lifestyles, instead of focusing on specific nutritional behaviors among the elderly. Most findings, however, showed consistently that those elderly individuals with an IHLC were more likely to accept greater responsibility for their health and to engage in more health-promoting lifestyle activities. On the other hand, those with external HLC, especially CHLC, were less likely to engage in health-promoting lifestyle activities. As for nutritional behavior, the evidence indicated that behavioral control was independently associated with dairy product consumption and higher vegetable intake.

HLC and Health-Related Behavior in Taiwanese Elderly

Although the relationship of HLC to ethnic group membership has received some research attention, only a few studies have investigated HLC in respect to the elderly in Taiwan. Most of these studies investigated the relationship between HLC and illness-related behaviors in adults. Lin and Liang (1997), for example, conducted a descriptive study to examine the relationship between HLC and compliance with therapeutic regimens. In that study, a convenience sample of 86 hemodialysis patients was obtained at two hemodialysis centers in Taiwan. The results showed that with high scores on the PHLC correlated positively with the patients' self-reports of compliance ($r = .39$, $p < .01$) and with the laboratory assessments of compliance ($r = .21$, $p < .01$).

In a more recent, cross-sectional study, Ko and Hsu (2005) investigated the relationship between informational needs and HLC with uncertainty among 81

hospitalized women with gynecological diseases in Taiwan. The findings suggested that women's experience of uncertainty may be elevated by the control belief of CHLC.

Only one study was found that addressed the well elderly in Taiwan. Wang and Hsu (1997) examined the relationship between health-promotion behaviors and related factors for 500 elderly participants living in Southern Taiwan. The results showed that elderly persons who agreed that they could control their health had higher mental health, better sleep, more health responsibility, and higher self-care scores. However, nutritional behavior was not related to HLC.

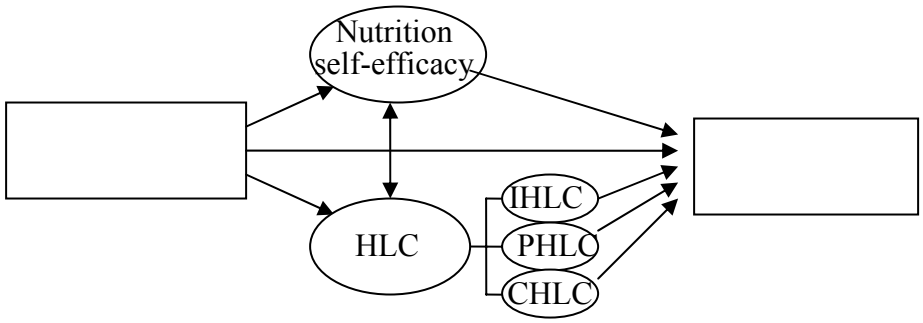
As stated previously, the bulk of research has focused on the association of HLC and illness-related behaviors, and the results of those studies are inconsistent. Thus, the nature of control orientation of the Taiwanese elderly is unclear. Similarly, the relationship of HLC and nutritional behavior is also unclear and warrants further study.

Summary

The examination of HLC orientation is important in the determination of nutritional status because a person's overall pattern of nutritional behavior may be related to that person's control-belief orientation as well as to his or her self-efficacy. Unfortunately, most of the research in this area has investigated HLC in relation to general health-related behaviors rather than to nutritional issues within the elderly population. The literature review, however, does provide insights into HLC and health-related behaviors; namely, persons identified as having IHLC reported better health behaviors than persons who reported an external control locus. In elderly populations, HLC was somewhat different from HLC in the younger population. Some studies revealed that the elderly were more externally oriented than younger persons, and studies

also found that the elderly with a strong PHLC had poorer health-promoting behaviors. In Taiwan, few studies have focused on the relationship between HLC and community-dwelling elderly; instead, most studies explored the effect of HLC on illness-related behaviors. All in all, current research is limited regarding the role of HLC in explaining and predicting health-related behaviors, especially for the elderly living in Taiwan. Therefore, our understanding of the role of HLC remains partial and inconsistent.

The Relationship of Self-Efficacy and HLC



The consensus among the research reviewed is that self-efficacy has a significant effect on health-related behaviors. In the HLC literature, however, the findings are mixed as to whether HLC can predict health behaviors. Of particular importance is how self-efficacy and HLC work together to predict health-related behaviors. This section, therefore, reviews the relationship between self-efficacy and HLC and their associations with health-related behaviors among the elderly. Because no study has examined the relationship between self-efficacy and HLC in Taiwanese elderly, the research evidence comes predominantly from Western and overall Chinese populations.

The Relationship of Self-Efficacy and HLC among Western Populations

To determine the relationship of self-efficacy and HLC to health-related behaviors, Wellborn (1990) tested two hypotheses: (a) overweight and exercise behavior could be predicted from self-efficacy and HLC, and (b) self-efficacy could predict overweight and exercise behavior only for individuals with IHLC. A total of 843 employees were recruited for the study. Through stepwise multiple regression, the findings revealed that self-efficacy accounted for a greater percentage of the variance than HLC for overweight and exercise behavior, and there was no support for the hypothesis that self-efficacy would predict overweight and exercise behavior for individuals with IHLC only. Moreover, the results indicated that the relationship between self-efficacy and HLC was weak.

Martinelli (1996) investigated relationships among environmental tobacco smoke, HCL, and self-efficacy in a sample of 136 never-smokers with an age range of 18 to 25 years (M = 20.0). The participants were predominantly female (67%) and White (78%). Findings showed that self-efficacy, but not HLC, was significantly related to the avoidance of environmental tobacco smoke. As for the relationship between HLC and self-efficacy, CHLC had a significant inverse relationship to self-efficacy; that is, students with lower self-efficacy were likely to attribute their health to chance. Because the sample was restricted to a single setting (a private university), caution is necessary in generalizing the results to other populations.

In a qualitative design, Reicks et al. (2004) explored how spirituality affected intrapersonal characteristics of persons in a weight-loss program. The author conducted a series of five focus-group interviews with 32 women who had recently participated in a

weight-reduction workshop. The women ranged in age from 34 to 72 years, with a mean age of 50 years. Most participants were White, fairly well educated, and were of moderate income levels. The findings revealed that most of the women felt in control of their food choices and were responsible for meeting their own program goals. According to this study, IHLC is beneficial to weight management, however, no linkages between self-efficacy and HLC appeared in the study. Moreover, although the results from self-reports can be valuable, the women in this study may not have been a representative sample; that is, all had recently participated in a weight-reduction program, indicating that they may have had more self-efficacy than women who would normally not join such a program.

Braman and Gomez (2004) took a different approach in the study of self-efficacy and HLC. They assessed the value of personality variables for predicting the type of relationships patients prefer with their doctors. Fifty men and 70 women were randomly selected from a volunteer pool maintained by the psychology department of a university. The participants ranged in age from 40 to 96 years (M = 72.0, SD = 10.0) and they were generally highly educated (M = 14.0, SD = 2.81). The results of the study indicated that patients who had greater self-efficacy reported more information-seeking behaviors when they visited doctor. In contrast, patients who were more PHLC oriented were more likely to stress the importance of doctors in health matters and were less likely to participate in decision-making regarding their medical treatment. Interestingly, IHLC showed no relationship with patient preference. Moreover, self-efficacy was significantly and positively related to IHLC (r = .24, $p < .01$).

In a study of the elderly population, Chen (1999) identified and examined relationships among HLC, self-efficacy, and self-care behaviors of elderly persons with hypertension (N = 120), whose ages ranged from 65 to 90 years (M = 73.6 years, SD = 6.0 years). The majority of the participants were female (74%) and Anglo (81.8%). The findings indicated that the subjects had a strong sense of their own control over their health, had a strong perception of their self-efficacy and well-being, and engaged in self-care to a high degree. In this sample, HLC and self-efficacy were highly correlated (r = .60, $p < .01$). In addition, a stepwise regression analysis showed that HLC and self-efficacy explained 39% of the variance in self-care, and self-efficacy contributed most of the variance in the prediction of self-care. In assessing HLC, however, the researcher measured only IHLC and CHLC. That restriction may have caused a loss of information because powerful others has been shown to be an important factor in health behaviors in the elderly (Lachman, 1986). Moreover, the response rate of the study was low (26.5%), indicating that the sample was highly self-selective and therefore may have represented a unique sample of elderly persons with hypertension.

Leganger and Kraft (2003) questioned the influence of education on self-efficacy, HLC, and health-related behaviors. They examined the relationships among education, HLC, and self-efficacy. Their results showed that higher educational levels were associated with stronger beliefs in self-efficacy and less belief in CHLC. In addition, they found that control beliefs partly mediated the relationship between education-intention and health behaviors. This study, however, did not find a relationship between self-efficacy and HLC.

The review of research related to self-efficacy and HLC among Western samples found that most of the studies focused on adult populations and that the findings were inconsistent. Those studies shown that self-efficacy may be highly correlated with HLC, partially related to HLC, or have no relationship with HLC. Moreover, some researchers failed to examine the relationship between self-efficacy and HLC even though they included both variables in their studies.

The Relationship of Self-Efficacy and HLC among Chinese Populations

Taking a cultural perspective, Sun and Wu (1997) argued that cultural and societal factors often influence the control beliefs of a population. Tang, Wu, and Yan (2002) examined the association between death anxiety and psychological variables of self-efficacy and HLC among the Chinese in Hong Kong. In their study of 282 college students (105 men and 177 women), the researchers found that both self-efficacy and HLC were related to death anxiety; specifically, those with low levels of self-efficacy and external HLC were more likely to report a higher level of death anxiety. The researchers, however, did not report the relationship between self-efficacy and HLC.

Another study designed to evaluate the relationship of self-efficacy and HLC among older adults was conducted by Wu, Tang, and Kwok (2004). In that study, the researchers tested the associations among HLC, self-efficacy, and psychological distress in elderly Chinese women who had chronic physical illnesses. The sample included 159 elderly Chinese women between 60 and 89 years old (M = 74.0, SD = 6.80). A majority of these elderly women belonged to the middle or lower social class, and their educational attainment was junior high school. Results indicated that the participants' psychological distress was best predicted by a low level of self-efficacy and a high level

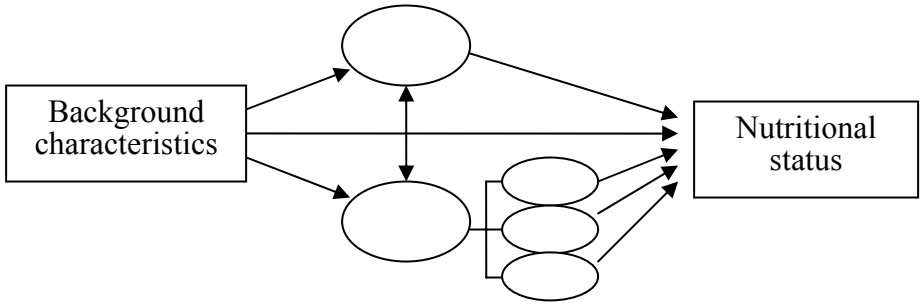
of external HLC. Even though correlation results showed that IHLC was positively related to self-efficacy ($r = .37$, $p < .01$), it did not contribute to the prediction of distress. In particular, this study found that external HCL emerges as a significant negative predictor of the participants' mental-health status, and its predictive power remained evident even after controlling for the effects of self-efficacy.

The literature related to self-efficacy and HLC among Chinese populations provides inconsistent and incomplete findings. Because of the narrow scope and the small number of nutritional-behavior studies that target Chinese elderly, an understanding of the relationships among self-efficacy, HLC, and health behavior is lacking.

Summary

In the review of studies addressing the association between self-efficacy and HLC among elderly, most studies found that self-efficacy was a more powerful predictor of behavioral outcomes than HLC. Some studies found that self-efficacy was positively related to IHLC and negatively related to CHLC, findings that suggest associations among self-efficacy, HLC, and health behaviors. Other investigators have not found this relationship, or they chose not to examine the relationship between the two concepts. No studies were found that addressed specifically self-efficacy and HLC as they affect Taiwanese elderly persons, and only a few research studies have focused on the Chinese in Hong Kong. As a result, our understanding of the role of HLC is incomplete. Hong Kong, however, is a society that has been exposed to Western influences for over a century. The attitudes and beliefs of the people in Hong Kong may not reflect those of the typical Chinese culture. Moreover, self-efficacy and HLC may affect the elderly of Hong Kong and the elderly of Taiwan in different ways.

Background Characteristics and Nutritional Status in Elderly of Taiwanese



Many studies have found relationships between background characteristics and the dietary intake of older persons, and today researchers generally agree that background factors are important in the study of the nutritional status of the elderly (Contento, Michela, & Williams, 1995; Department of Health, 2004; Lee, 2004). Among the background characteristics, five play particularly significant roles in the nutrition of elderly Taiwanese: age, gender, educational level, living arrangements, and health problems and medications. This section, therefore, explores how those five background characteristics influence nutritional outcomes among elderly Taiwanese. Because only a few studies have focused on the healthy Taiwanese elderly, the evidence cited in this section also comes from studies conducted in the West.

Age

Many researchers contend that poor dietary habits and inadequate nutrient intake are major problems of the elderly. For example, a survey conducted by Howard, Gates, Ellersieck, and Dowdy (1998) showed that diets were inadequate in 16.7% of the elderly participants (N = 1113). Research describing the dietary habits of the elderly found that older subjects ate meat, fish, cereals, and raw vegetables less regularly (N = 9250) (Larrieu et al., 2004). Alarmingly, some studies found that over 50% of the elderly had

nutrition problems. Marshall et al. (2001), for instance, investigated the nutrient intakes of elderly persons and found that 60% of the subjects did not receive their estimated nutritional needs. Likewise, Keller and Hedley (2002) showed that more than half of the elderly (56.7%) were at nutritional risk (N = 425). More generally, Sharkey and Schoenberg (2002) suggested that age was directly associated with nutritional risk, even after controlling for the other independent variables (race, income, and living arrangement). A literature review regarding the elderly living in Taiwan shows that the aging process has an effect on food intake. Hsu (2003), for example, revealed that the percentage of obesity in the elderly population (N = 200) is more than one quarter (26%), the risk of malnutrition is almost as high (24.5%), and the actual number of elders who are malnourished is 2%.

Other authors, however, argue that the aging process alone has no significant adverse consequences on the food intake of elderly individuals. For example, Ernyhough et al. (1999) showed that, in a 6-year follow up, there was no indication of an age effect on nutrient intakes in the elderly. Indeed, the subjects were more likely to have shifted their diets toward healthier food than were their younger counterparts. Recent studies yielded similar findings. For example, respondents aged 65 and above were more than twice as likely to meet the threshold for a good diet than were respondents less than 50 years of age (N = 9925) (Finke & Huston, 2003), and they consumed more fruit and vegetables (N = 4622) (Sahyoun et al., 2005). Another study, one incorporating face-to-face interviews, revealed that the elderly were positive about their lives, creative in solving the problems of their independence, and consumed more healthful foods (Callen & Wells, 2003).

Thus, the research findings on age differences and nutritional outcome seem contradictory. Either of two opposing explanations may describe the relationship between aging and nutritional status. One possible explanation is as follows: as individuals grow older, health problems make them realize the importance of their health. They are thus more motivated to adopt healthy eating behaviors (Wang, 1999), to shift their diets toward healthier foods, and to adopt more positive attitudes toward eating (Callen & Wells, 2003). The other possible explanation is that aging individuals may suffer functional disabilities and chronic diseases, and those conditions could impede their ability and motivation to engage in healthy eating. Those health problems may include loss of sensory functions, oral health problems, and chronic disease (Callen & Wells, 2003; Elbon et al., 2000; Hall & Brown, 2005; Hsu, 2003; Sahyoun et al., 2005). Moreover, older people may not have disease but may think they have earned the "right" to indulge after a life time of healthy eating, e.g., enjoy life while you can.

Gender

Although men and women have different perspectives on diets, most of the research supports the position that elderly females have poorer nutritional outcomes than elderly males. For example, according to Keller and Hedley (2002) elderly females were more likely than elderly males to have nutritional risks involving the frequency of eating, difficulty in swallowing, and difficulty in grocery shopping. In a study of the difference in nutrient intake between the genders, Marshall et al. (2001) found that females had lower total calories and carbohydrate intake than males, and Sharkey et al. (2002) revealed that, compared to men, women had a significantly lower intake of total calories, protein, and eight of nine specific vitamin and mineral nutrients (N = 345). Ernyhough et

al. (1999), however, argued that more elderly women tried to shift their diet to healthy food than men, including an increase in the proportion of brown or whole-grain bread eaten and the regular and occasional use of vitamin and mineral supplements.

Most of the research findings regarding the elderly living in Taiwan were consistent with the research regarding the elderly in the West. For instance, in a study of 525 community-dwelling and 276 institutionalized elderly, Chan, Kao, Chin, and Lee (2002) found that females had poorer nutritional outcomes than males. Another study that examined the nutritional status of elderly Taiwanese (N = 245, M = 79.4 years, SD = 5.1 years) found that the daily calories intake of males was higher than that of females (1821.4 ± 483.7 kcal for males and 1358.7 ± 394.2 kcal for females) (Chen, 2002).

In the research studies reviewed, women generally had a lower nutritional status than men. There may be some explanations for those results. First, as the Sharkey et al. (2002) study showed, women were more likely to report difficulty in meal preparation and consumption. They were more likely to have a larger number of tasks that were either difficult or impossible to accomplish as compared to men (2.30 compared with 0.76 for men, $p < 0.01$). The most frequently reported limitations included reaching for a 2.25-kg (5-lb) object on a shelf (59%), bending to get a pan from a lower shelf (41%), using a manual can opener (34%), opening a new milk or juice carton (15%), and opening a jar that had not been opened previously (15%). For Chinese women, the reason for having a lower nutritional status than men may be related to their different social economic background. Chinese women living in Taiwan today still suffer from many injustices, explicitly or implicitly. For example, biases against woman regarding property rights and employment rights are still encoded in laws and customs. At home, women alone, bear

the burden of homemaking and child-rearing, with little recognition and minimal power. Thus, being female and being elderly means increased vulnerability (Lu & Chang, 1998). Those disadvantages may affect the nutritional outcomes for women.

Educational Level

Though socioeconomic status is multifaceted, an important indicator of socioeconomic position is educational level (Lasheras, Patterson, Casado, & Fernandez, 2001). Most studies have supported the view that educational attainment is associated with better nutritional status. For example, Grotkowski and Sims (1978) found that higher educational attainment was strongly related to positive nutritional attitude and better nutrient intake (N = 64). Other research indicated that those with higher levels of education more commonly consumed lean foods, whole-grain products, and supplements (N = 5406) (van Rossum, van de Mheen, Witteman, Grobbee, & Mackenbach, 2000). On the other hand, elderly persons who had not graduated from high school had lower dietary outcome scores (N = 180) (AbuSabha et al., 1997). One study found that participants in the high nutritional-risk category were more likely to have less than a 12^{th} grade education (Lokken, Byrd, & Hope, 2002). Those results were consistent with findings from studies in Taiwan showing that elderly persons with higher education had more knowledge about healthy eating (N = 1,539) (Lee et al., 1997), were more likely to improve the quality of their diets (Lee, 2002), and achieve a better nutritional status (Chan et al., 2002).

Most of the epidemiological literature contends that higher educational levels confer better nutritional status on the elderly. Two explanations for this finding are plausible. First, educational level is positively related to nutritional knowledge. People

with higher education are more likely to have access to better nutritional information, such as health services, mass media, magazines, and cookbooks (Grotkowski & Sims, 1978). With more nutritional knowledge, the elderly have more confidence in the foods they buy, hold more positive nutritional attitudes, have better eating behaviors, and experience better nutritional outcomes (Elbon et al., 2000; Lin & Lee, 2005; Pullen, Walker, & Fiandt, 2001). Second, higher education is related to higher income (Guthrie & Lin, 2002; Kant et al., 2004). Research shows that elderly persons with higher educational levels can more likely afford to entertain others with food and to eat in restaurants. Furthermore, they have the means to purchase healthy foods (Grotkowski & Sims, 1978). In contrast, elderly persons on limited budgets may not have the means to repair or adjust any dental, visual, and auditory dysfunctions (Lasheras et al., 2001), and they may lack the education to recognize and purchase healthy foods and to identify accessible health services. It is clear that those factors can adversely affect nutritional status (Grotkowski & Sims, 1978).

Living Arrangements

Eating regular meals and having an adequate diet have been found to depend, at least in part, on eating with others. Although some studies indicate that living alone has no effect on nutritional intake (AbuSabha et al., 1997; Pullen et al., 2001), many authors argue that mealtime companionship and social interaction lead to improvements in food consumption and nutritional status among the elderly. On one hand, elderly persons who shared meals with others were found to increase their food consumption (Rainey et al., 2000), improve the quality of their diet (Grotkowski & Sims, 1978), have better eating behavior, and raise their nutritional status (Vellas et al., 2000). On the other hand, elderly

persons who lived alone and had no companionship during their meals were less regular consumers of almost all types of foods (Larrieu et al., 2004), were more likely to lack fruits and vegetables in their diets (Sahyoun et al., 2005), and often skipped meals or ate only one meal a day (Mayo & Rainey, 2001). Not only is social isolation, associated with nutritional risk (Sharkey & Schoenberg, 2002), it can deprive one of the congenial pleasures associated with eating (Hall & Brown, 2005).

Studies of Taiwanese elderly persons are consistent in their findings with the studies of elder persons conducted in the West. Studies in Taiwan reveal that living arrangement is a significant predictor of nutritional behaviors in the Taiwanese elderly (N = 391) (Wang, 1999). Elderly persons who are not living with their families are less likely to adopt health-improving behaviors (N = 2071) (Hsu, Hsu, Shu, Shih, & Tai, 2003), are more likely to follow diets with less nutritional variety, and demonstrate lower nutritional status (Chan, 2000; Lee, 2004). In fact, Tsai et al. (2004) warned that, for the Taiwanese elderly, social isolation or lack of support from their families could lead to a severe reduction of nutrition intake and result in malnutrition.

In Taiwan, there is an emphasis on mealtime companionship. That emphasis has historical and cultural roots and relates closely to the life perspectives of elderly people. In historic terms, the current generation of the elderly in Taiwan had different life experiences than younger generations. The elderly had to face the chaos of war, and many became destitute and homeless (Lu, 1998). To live with their families and to eat together, therefore, are considered expressions of love and belonging, and they give the elderly a sense of being a part of a family.

The cultural perspective is also important. For the Chinese, family ties are as strong as religious beliefs (Chen, 2001; Sagaza, 2004). In keeping with the Chinese philosophy of filial piety, duty to parents demands strict obedience, and a son has the moral obligation to serve his parents with all sincerity. Thus, age implies dominance within any given Chinese family (Chae, 1987; Chen, 2001; Guo, 1995). Consequently, senior family members believe that being respected and supported by their children is essential for their happiness and health; if the offspring demonstrate filial obedience-for example, by preparing the meals and eating together-the elders feel proud and treat this show of respect as their life's achievement (Lu, 1998). The family values are centered on the elderly, and such close family networks provide support for a number of food-related functions, such as shopping assistance and food preparation. Thus, living with family provides elderly persons with an environmental resource that may facilitate healthy eating behaviors and lead to better nutritional status.

Health Problems and Medications

As presented in the previous section, the leading barrier to maintaining nutritional health is health problems. For example, loss of full sensory capacity, including taste, smell, and vision, due to age may have a negative impact on food intake (Elbon et al., 2000; Hall & Brown, 2005; Rainey et al., 2000; Schoenborn, Vickerie, & Powell-Griner, 2006). A reduction in masticatory ability and oral health may result in poor nutrition or shifts to different foods and eating patterns (Sahyoun et al., 2005; Schoenborn et al., 2006; Yoshihara et al., 2005). Moreover, the number of chronic disease and polypharmacy are important factors related to meal preparation and consumption (Sharkey et al., 2002; Tsai et al., 2004). Those health problems and medications may

influence functional status of the elderly, thus decreasing the ability to purchase and prepare food, and may also impede or diminish their motivation to engage in healthy eating.

Summary

The research literature addressing the background characteristics affecting the nutritional status of elderly persons has been reviewed, and the most important factors relating to the nutritional status of the Taiwanese elderly were identified. The aging process affects dietary behaviors and has nutritional consequences. Gender differences were shown to give men and women different perspectives on diets. An important factor that also influences elderly nutritional behavior is educational level. A living arrangement that allows eating with others helps improve diet quality and enhances nutritional status. Finally, health problems may represent barriers to maintaining nutritional health. Thus, aging, gender, educational level, living arrangements, and health problems and medications, may all strongly affect the nutritional status of the Taiwanese elderly. Older people are a heterogeneous group, and their views of diet and health will differ according to those background characteristics.

Conclusion

The research literature pertinent to self-efficacy, HLC, and nutritional status in the elderly was reviewed in this section. The literature leaves no doubt that good nutrition may be related to longer life span, better health-related quality of life, and the prevention of illness. Unfortunately, most researchers point out that the elderly tend to have poor dietary habits and inadequate nutrient intakes. Nutritional status of the elderly appears to be a complex and multidimensional concept. Many factors may influence nutritional

outcomes: not only the physiological changes, but also psychological factors. For example, self-efficacy is an essential factor in the nutritional behaviors of the elderly, and HLC is an important factor that may explain elderly control beliefs. The literature, however, provides inconsistent findings regarding the relationship between self-efficacy and HLC. Moreover, the association of self-efficacy and HLC among elderly Taiwanese has hardly been examined. Given this background, there is a great need to examine the relationships among self-efficacy, HLC, and nutritional status in the Taiwanese elderly. Finally, the literature review identified five background characteristics that play particularly significant roles in the nutrition of elderly Taiwanese: age, gender, educational level, living arrangements, and health problems and medications. Those background characteristics are of critical importance in any exploration of the relationships among self-efficacy, HLC, and nutritional status among Taiwanese elderly.

CHAPTER 3

METHODS

This chapter describes the methods used to determine the relationships of nutrition self-efficacy, health locus of control (HLC), and nutritional status in the Taiwanese elderly population. The chapter delineates the research design, the population and sampling method, procedures for data collection, instrumentation, the pilot study, and the methods of data analysis. In addition, the chapter represents the measures taken to protect the rights of the participants.

Research Design

Quantitative Approach

A correlational, cross-sectional research design that included face-to-face interviews was selected to explore the relationships among background characteristics, nutrition self-efficacy, HLC, and nutritional status within the Taiwanese elderly. Although many independent variables are well known and ample evidence exists to support their correlations with nutritional status, this researcher found no studies directed toward elderly populations living in Taiwan. A cross-sectional design, therefore, allows the researcher to generate a snapshot of the phenomena of interest and thereby examine, for the first time, the relationships among the variables in a sample of Taiwanese elderly (Creswell, 2003; Trochim, 2001). Moreover, a cross-sectional research design has the strengths of economy and efficiency, and it was the most convenient and feasible method to satisfy the objectives of this study (Creswell, 2003).

Face-to-face interviews were used to collect the survey data in this study. Such interviews represent a far more personal form of research than questionnaire surveys because the interviewer can work directly with participants (Trochim, 2001). In addition, the interviewer has the opportunity to determine whether participants are having difficulty understanding the questions, perhaps because of a poor grasp of the language, limited intelligence, problems in concentration, or boredom. Moreover, this method of administration allows the interviewer to rephrase questions in terms the person may better understand or to probe for fuller responses. Finally, interviews can reduce the number of questions the participants omit and thus enhance the response rate (Streiner & Norman, 2003; Trochim, 2001). Based on the above, although they are more time-consuming, face-to-face interviews are generally easier to conduct, and they are more appropriate for the elderly of Taiwanese who may be illiterate and/or visually impaired.

On the other hand, the correlational, cross-sectional research design has certain weaknesses. For example, it is limited in its ability to explain causal relationships between variables because it allows no manipulation or control of the independent variables (Creswell, 2003). Furthermore, the cross-sectional design can not reveal changes in nutrition self-efficacy, HLC, and nutritional status over time. In effect, the design provides only a snap shot of the phenomena of interest and its related variables for any specific population (Creswell, 2003).

Qualitative Approach

Another method for this study included qualitative approach using content analysis. Qualitative research is used to describe a research problem that can best be understood by exploring a concept or a phenomenon (Creswell, 2003). The goal of this

research method, therefore, is to document and interpret as fully as possible the totality of what is under study from the subjects' point of view or perspective. Through open, unstructured questions and responses by the participants, subjective information which may not be explored through the use of the selected measurement instruments can come forward.

Content analysis has been defined as a systematic and objective research method for examining the contents of recorded information (Waltz, Strickland, & Lenz, 2005). In this study, the use of content analysis helped in the reduction of recorded open-ended responses into sets of categories. Specifically, this study used the content analysis recommended by Waltz et al. (2005) to answer the sixth research question, namely, how do Taiwanese elderly describe their eating patterns? By responding to that question, participants had the opportunity to describe their eating patterns in their own words.

For the purposes of this study, a single open-ended question was developed and inserted into the demographic information sheet. The question asked, Is there anything else you would like to tell me about your eating patterns? During the open-ended, unstructured interview, the participant was encouraged to talk about his or her eating patterns as he or she aged. Interviewer comments reflecting on what the informant had said were used to encourage the person to continue. In addition, the interviewer took notes to capture the participants' comments during the interviews.

For this study, which complementary data sets from both quantitative and qualitative research work together and give a more complete picture than can be obtained using either method singly. By having both numerical and contextual data, adds not only

empirical information to the body of knowledge, but includes the perspective of these elders.

Population and Sample

Setting

Yilan, which is located in Northeast Taiwan, is a county blessed with natural beauty and a rich culture. In 2005, the population density of Yilan County was 215 persons per square kilometer and it had 55,152 persons aged 65 and older, for an elderly population of 11.95% in Yilan County, which represents 3.10% of the elderly population in Taiwan (Department of Household Registration Affairs, M. O. I., 2005; Department of Household Registration Affairs, M. O. I., 2006).

A random selection of 2 out of 10 district public health centers in Yilan County were used for the research setting, primarily because (a) Yilan is a County in Taiwan with an aging population, 11.95% compared to the overall elderly population in Taiwan (9.80%) (Department of Household Registration Affairs, M. O. I., 2006); (b) Taiwanese elderly in Yilan County live an agricultural lifestyle, the predominant lifestyle of people in Taiwan; and (c) Yilan County is accessible to the researcher. Permission to interview the participants has been obtained from the director of the Public Health Bureau of the Yilan County government in Taiwan (see Appendix B).

Sample Background Characteristics

The population of interest in this study included community-dwelling Taiwanese elderly persons aged 65 or older. The participants in this study were limited to community-dwelling elderly because most other studies have been conducted with elderly who have pathologies while ignoring the elderly who are healthy. The intent of

this study was to describe physiological, behavioral, and sociological variables in a sample of individuals who have reached their later years in relatively good health. Therefore, individuals who suffer from terminal illnesses, for example advanced cancer, were excluded.

The criteria for inclusion in the study were as follows: (a) an age of 65 years or older, (b) completed the 2007 annual health evaluation, (c) noninstitutionalized, (d) capable of ambulating, (e) an ability to communicate orally or in writing, and (f) availability to the researcher for 30 to 50 minutes of data collection. If a person had a disease that affected nutritional intake such as a terminal illness, was hospitalized, was obese as determined by BMI, was unable to ambulate at this time or unable to sign the consent form, that person was excluded.

The rationale for these criteria was to obtain a sample of study participants who were as homogeneous as possible with respect to their nutritional status. The exclusion criteria are also critical to the study because they ensure that the participants are able to understand information given by the researcher and can communicate answers to the question items.

Sample Size

As Cohen suggested, a statistical power analysis should determine the relationships among the four variables involved in statistical inference: sample size, the significance criterion (α), population effect size, and statistical power (Cohen, 1992). For any statistical model, those relationships are such that each is a function of the other three. The risk of mistakenly rejecting the null hypothesis and thus committing a Type I, or alpha, error represents the maximum risk. The alpha level for this study was set at a

conventional level of .05, which is used for a wide range of behavior-research studies (Cohen, 1992). For this study, acceptable power, which was the probability of rejecting a false hypothesis, was set at .80, since that figure has been proposed for general use (Cohen, 1992).

The participants for this study were a minimum of 135 elderly drawn from Yilan County in Taiwan. The reasons for this sample size are as follows. First, the effect size was determined based on a literature review. Although no published data are available regarding the relationship between nutrition self-efficacy, HLC, and nutritional status, the range of effect sizes used in this study to calculate the sample size was taken from studies that are most similar to this study. Based on Cohen (1992), small, medium, and large effect sizes (f^2) for calculating multiple regression are .02, .15, and .35, respectively, and the formula used for calculating the population effect size is $f^2 = R^2/1\text{-}R^2$. Literature showed that the population effect size that closely related to this study was from medium to large (f^2 = .11-.61) (see Table 1). In light of the paucity of studies that match the current model and considering the analyses planned for this study, the medium effect size (an the average effect size of .29) was postulated for calculating the sample size.

Table 1

The Population Effect Size

References	Relationship (s)	Effect size
Williams & Bond, 2002	Diet self-efficacy and self care	$f^2 = .28$
Chen, 1999	HLC, general self-efficacy, and self care	$f^2 = .61$
Rock, Meyerowitz, Maisto, & Wallston, 1987	IHLC and behavior involvement	$f^2 = .11$
	PHLC and behavior involvement	$f^2 = .30$
Waller & Bates, 1992	IHLC and general self-efficacy	$f^2 = .22$
	IHLC and healthy lifestyle,	$f^2 = .40$
	General self-efficacy and healthy lifestyle	$f^2 = .27$
	General self-efficacy and IHLC	$f^2 = .22$
Wu, Tang, & Kwok, 2004 (Chinese)	General self-efficacy and PHLC versus psychological distress	$f^2 = .18$

Second, the sample size calculation was also based on the results of a pilot study conducted by the researcher. Borenstein and Cohen's (1988) computer program of power analysis was used to calculate sample size. To estimate the appropriate sample size for the pilot study, predictors from the selected five background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, and three subscales of the Multidimensional Health Locus of Control (MHLC, including IHLC, PHLC, and CHLC) were used for the outcome of nutritional status among Taiwanese elderly. The pilot study showed that the R^2 between background characteristics and nutritional status was .05; after the addition of nutrition self-efficacy and the three subscales of MHLC, the R^2 was .42. Based on the reviewed literature and the suggestion of Cohen (1992), a medium effect size was chosen. An 80% level of power was viewed as adequate to estimate a sample size in general (Munro, Jacobsen, Duffy, & Braitman, 2001). Accordingly, with a medium effect size, the value of the squared multiple correlation (R^2) for the model of nine variables was .42. Thus, for an alpha of .05, a total of nine variables, an R^2 of .42, and a power of .80, a minimum of 100 participants were required for data analysis using multiple linear regressions.

Finally, the general rule of thumb for the ratio of participants to predictors is at least 10:1 (Maxwell, 2000). According to that general guide, the sample size needed for nine predictors were 90 participants. Another author, Stevens (1999) argued that 15 participants per predictor are needed for a reliable regression equation. Therefore, for the nine predictors in this study, 135 participants were suggested.

Based on the above, the estimate of the sample size for this study was from 100 to 135. Because the sample in the pilot study was small (N = 30), the application of the

above average correlation coefficients was limited. Therefore, a sample of 135 Taiwanese elderly participants was a minimum requirement.

Sampling Procedure

156 Taiwanese elderly participants were recruited by random selection from two district public health centers in Yilan County in Taiwan. First, the researcher contacted the director of the Public Health Bureau of the Yilan County government and requested permission to interview the participants (see Appendix B). Second, two out of the ten district public health centers in Yilan County were selected at random for the research settings. Third, simple random sampling was used to select participants from a list of names of persons completing the 2007 annual health evaluations (see Figure 2).

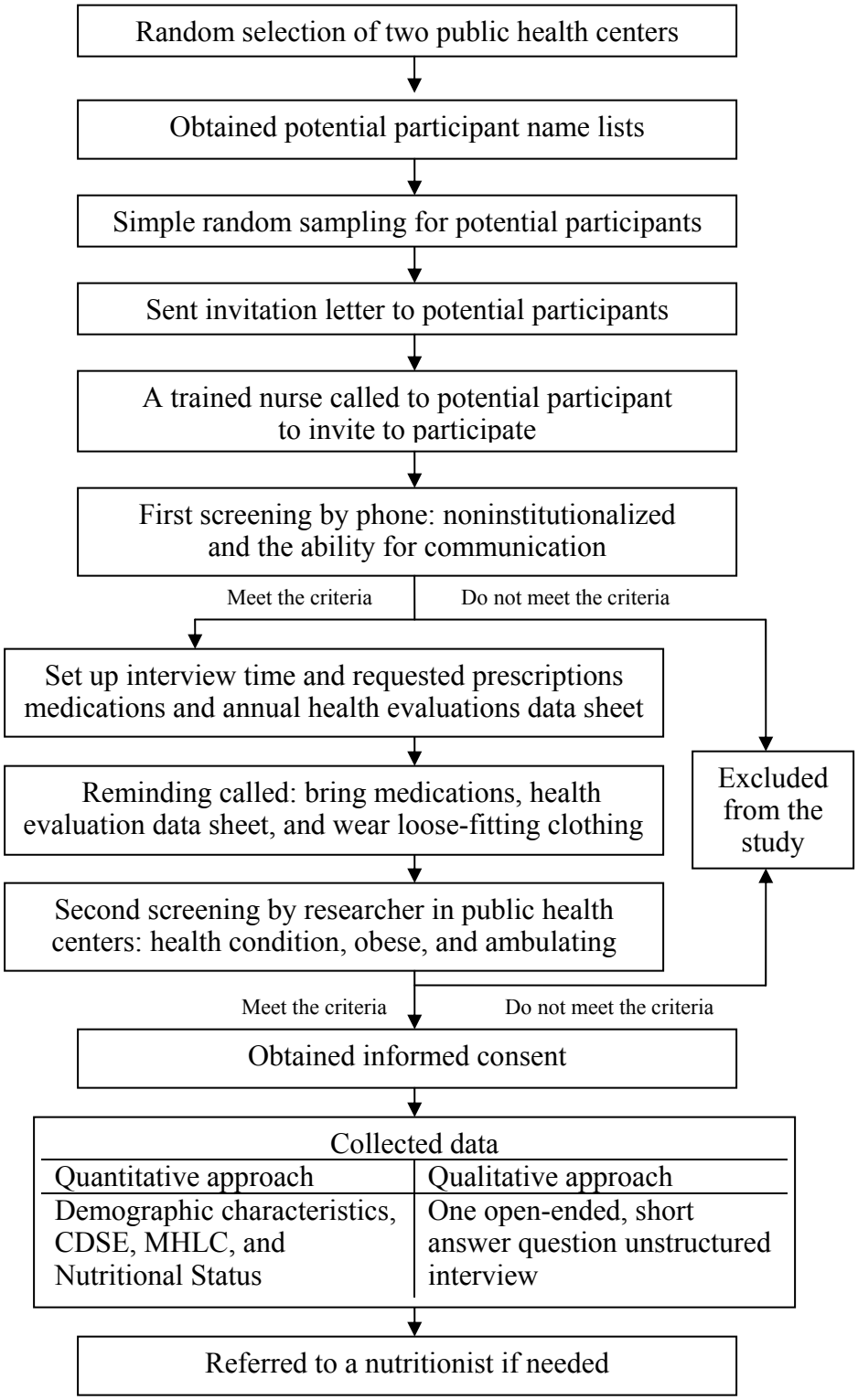


Figure 2. Sampling and data collection procedures.

Procedures for Data Collection

After approval by the Institutional Review Board (IRB) for the Protection of Human Subjects at the University of Texas at Austin (see Appendix A), the researcher began the study.

To invite potential participants to participate in the research, a list of names of persons completing the 2007 annual health evaluations was obtained from the two randomly selected public health centers, and then simple random sampling was used to select names to invite as research participants. A letter of explanation and invitation for this study was sent to each potential participant (see Appendix D). To ensure the recruitment process was ethical, an intermediary recruitment method was used. After the letters have been sent to the potential participants, a trained nurse called each potential participant randomly selected. The nurse reviewed a brief explanation of this study, and if the person agrees, the first screening was scheduled. A telephone text (see Appendix E) was used to ensure consistency in telephone invitation and initial communication. Participants were excluded from the study if they were institutionalized, and/or were not able to communicate verbally.

If they were eligible to participate in the study, the nurse set up an interview, at their convenience, in the public health center, where the researcher collected the data. Also, the nurse asked them to wear loose-fitting clothing for anthropometric measurements, and bring their prescriptions medications, and their 2007 annual health evaluation data sheet to the interview. Moreover, the day before meeting, a reminding call was made to emphasize the meeting time, place, bring medications, health evaluation data sheet, and wear loose-fitting clothing.

When the researcher met the potential participants in the public health center, she assessed the participants' condition regarding the presence of health problems, obesity as or not determined by BMI, and the ability to ambulate. The potential participants were excluded if they had a disease that affects nutritional intake (e.g., advanced cancer), were obese, or were unable to ambulate at this time, the researcher told them why they could not participate in this study, and discussed any nutrition issues they might wish to discuss. Should the participant forget to bring medications or the annual health evaluation sheet, the researcher called and asked them about their medications names from labels and health evaluation data after the interview.

Elderly persons who met all of the inclusion criteria participated in face-to-face interviews with the researcher in the public health center offices. Before data collection, the researcher explained the study, the participants' rights, the policy regarding confidentiality, and the benefits of participating. Next, the prospective participants signed consent forms if they agree to join the study (see Appendix C). If language or reading ability was an issue, the researcher read the consent form aloud for the participant. A copy of the consent form was given to the participant to keep. To maintain consistency throughout the study and yet gather data efficiently, the researcher was the only interviewer.

After the participants agreed to the terms of the study and the consent form was signed, data collection began. An individual interview was conducted independently with each participant to complete the demographic information sheet, the Cardiac Diet Self-Efficacy (CDSE) scale, the MHLC scale, the Mini-Nutritional Assessment (MNA), and the anthropometric assessments. Finally, one open-ended, short answer question was

included at the end of the demographic information sheet to gather in-depth information about eating patterns in this sample. The researcher later accessed participants' health records to gather data on albumin levels. After data collection, the participants were referred to a nutritionist if their nutritional status is inappropriate, for example, the MNA score less then 23.5.

For the interviews, a room in the public health center office was chosen that provided a private, quiet environment and a convenient restroom. The participants were told that they might ask for a rest any time during the data collection process. Each interview took between 30 and 50 minutes to complete. Because the feedback from the pilot study indicated that two elderly persons had difficulties with the Likert scale ratings, the researcher used toy blocks of different numbers and colors to represent the numerical points on the instrument scales. Bernal, Wooley, and Schensul (1997) suggested this type of visual aid for use in questionnaire administration.

Instrumentation

The four instruments used in the study included demographic information sheet, the CDSE scale, the MHLC scale, and the MNA scale (see Appendices G through H). The developers of the instruments granted permission for the use of their instruments in this study (see Appendix F). Each instrument is described below.

The Background Characteristics

The purpose of the demographic information sheet was to collect information regarding personal and social background (age, gender, educational level, living arrangements, health problems and medications). The demographic information sheet, which was developed by the researcher, was used to obtain a description of the sample.

The sheet identified background characteristics of the participants that may relate to variations in the responses to the measures and influence the researcher's interpretations of the data. In addition, the demographic information allowed the researcher to examine relationships among background characteristics, nutrition self-efficacy, HLC, and nutritional status of the Taiwanese elderly participants.

Age was calculated by subtracting the date of birth from the date of participation in the study (Item 1). Gender was determined based on differences in biology (Item 3). Education level was assessed based on the number of years of schooling. Because the pilot study showed that some participants had not finished elementary school but had educated themselves, it is permissible to ask people whether or not they can read Chinese, thus literacy or illiteracy was also measured (Items 9 and 10). Living arrangements, in accordance with the results from the pilot study feedback from participants, was measured by living situation and also by eating partnership (Items 12 and 14).

Health problems and medications were determined by adding the self-reported number of chronic diseases and the number of medications used together (Items 16 and 18). First, the total chronic disease score, ranging from 0 to 10, was obtained. The top ten chronic diseases of the elderly in Taiwan are cancer, cerebrovascular disease, heart disease, diabetes mellitus, pneumonia, nephritis, nephrotic syndrome and nephrosis, chronic liver disease and cirrhosis, hypertensive disease, arthritis, and injury (Department of Health, 2005). Therefore, to provide information on the relationship between health conditions and nutritional status, the study assessed the participants in regard to those ten chronic diseases. Participants received one point for each disease they currently and ever had. The higher the scores, the worse the participants' health conditions (Item 16). For

medications use, the participants were instructed to bring all prescriptions medications to the interview and prescription medications containers were visually inspected and listed. For each individual, a count was made of the type of medication taken, and a score was given based on the sum of medications (Item 18). Thus, medication use was a continuous variable indicating the number of individual prescriptions medications currently taken. These two items are commonly used to measure health conditions in elderly.

Nutrition Self-Efficacy

The CDSE scale was used to measure nutrition self-efficacy. The CDSE scale, originally developed in the early 1990s, was intended to measure one's self-efficacy regarding healthy diet behavior (Hickey et al., 1992). The 16 items of the CDSE scale constitute a self-report measure, with the participants responding to each item on a five-point scale of confidence (1 = very little to 5 = quite a lot). The total score of the CDSE scale is obtained by summing the score of the items (16 through 80); the greater the score, the more confidence the participant has in employing healthy diet behaviors. The instrument has been tested within the cardiac population, but it can be used with the general population (Hickey et al., 1992).

When the CDSE scale was designed, the developers investigated its psychometric properties with two samples: participants in cardiac rehabilitation (n = 525) and participants who were marathon runners (n = 54) (Hickey et al., 1992). The results showed internal consistency estimates ranging from .89 to .92, and the test-retest stability correlation was .86. The content validity was acceptable. A factor analysis found that the CDSE addressed a single general construct.

When an instrument is administered to the elderly, however, feasibility and understandability are important (Jacobson, 2004; Scientific Advisory Committee, 1995). An analysis of the items shows that the CDSE scale is a simple and noninvasive scale, and it can be used either by self-report or interview. In regard to its understandability, the CDSE contains short-word and short-sentence scale items, it contains no double-negative items or words with three or more syllables, and it uses the active voice. With its strengths in feasibility and understandability, the CDSE scale imposes little burden on the elderly (DeVellis, 2003; Scientific Advisory Committee, 1995; Weinrich, Boyd, & Herman, 2004). Finally, the content of the CDSE is compatible with the type of information expected from the elderly in Taiwan, including healthy eating behavior skill (Items 1, 8, 9, 12, 15), reducing fat and cholesterol (Items 2, 14), resisting relapse (Items 3, 4, 5, 6, 7, 11, 13), increasing fiber and vegetable (Item 10), and reducing sugar (Item 16).

Generally, the reliability and validity of the CDSE scale are acceptable, and the feasibility and understandability of the scale suggest that the CDSE has potential for use with the elderly population. The instrument was developed for use with samples from a Western population, and the application of the CDSE scale across different cultures has been limited. Nevertheless, no tool exists in the current literature that measures the concept of nutrition self-efficacy as it relates specifically to healthy elderly persons. In the pilot study, before the test was administered to the target population of Taiwanese elderly, the CDSE was translated to the target language of Chinese. The translation process and results are presented in the section describing the pilot study. For pilot testing, the alpha reliability of the CDSE scale was .79.

Health Locus of Control

The MHLC scale was used to measure the HLC in this study. The original unidimensional locus of control was developed by Rotter (1966). In the 1970s, Levenson (1974) developed a multidimensional locus of control to represent the multiple control beliefs. Later, Wallston and his colleagues (1978) argued that Levinson's scale did not include items specific to expectations about health; therefore, they developed the MHLC scale. The MHLC consists of three, 6-item subscales: (a) internal health locus of control (IHLC), or internality, which measures the extent to which a person believes health is a function of one's own behavior; (b) powerful others health locus of control (PHLC), or powerful others externality, which measures the extent to which one believes his or her own health status is due to the action of "powerful" people; and (c) chance health locus of control (CHLC), or chance externality, which measures the extent to which one believes that chance, fate, or luck influences one's health.

The MHLC scale (Wallston et al., 1978) is used to measure perceived control of health. This instrument is an 18-item Likert-type scale. Each item is rated on a 6-point Likert scale ranging from strongly disagree (scored as 1) to strongly agree (scored as 6). Subscales are scored by summing the respective items for a total subscale score. Higher scores reflect stronger endorsement of the particular subscale content area. Thus, the higher the score of the IHLC, the greater the personal control the participants perceive they have over their own health. The higher the scores on the PHLC and CHLC, the more personal health they attributed to powerful others and chance, respectively.

For reliability and validity, the developers first determined internal consistency, and the alpha reliability was from .67 to .77 for the original validation sample of

community-dwelling individuals aged 16 and older. The IHLC and PHLC were significantly statistically independent, the IHLC and CHLC were negatively correlated, and the PHLC and CHLC were positively correlated. Correlations were computed between health status and the MHLC scores, and the results showed that health status correlated positively with IHLC (r = .40, p < .01), negatively with CHLC (r = -.28, p < .01), and did not correlate with PHLC (r = -.06, p > .05) (Wallston et al., 1978). Test-retest stability coefficients also ranged widely, depending on the time interval, with the majority reported as r = .60 to .70. Finally, the reading levels of the MHLC were reported as ranging between fifth and sixth grade levels (Wallston et al., 1978).

The MHLC has been applied in studies of the Taiwanese elderly since the 1980s. Huang (1988) translated the English version of the MHLC into a Chinese version. Wang, Lee, Yang, Lo, and Deng (1997) concluded that the Chinese version of the MHLC yielded Cronbach's alphas of .68, .81, and .71 for the IHLC, PHLC, and CHLC, respectively. Similarly, another study found that the Chinese version of the MHLC yielded a CVI for content validity that was high (.97) and a Cronbach's alpha for internal consistency reliability that was acceptable (all three subscales' alpha = .78) (Yang, 2003). Results from the pilot study, the alpha reliability for the MHLC, three subscales of IHLC, PHLC, and CHLC were .80, .88, and .81, respectively. Consequently, the MHLC is a useful scale for evaluating Chinese control beliefs.

This questionnaire was chosen for a number of reasons. First, it has respectable reliability and validity ratings. Second, it is succinct enough to be completed in a short period. Finally, it provides information regarding different aspects of HLC. As Bernal et al. (1997) suggested, the decision about how many points to include in the Likert-type

scales may be based on such factors as the age, educational level, motivation, and cognitive level of participants. Moreover, for use in Taiwanese elderly persons, a non forced-choice response scale allows participants to express no opinion (Streiner & Norman, 2003; Trochim, 2001). Based on the above information, the 6-point scale of the MHLC was revised into a 5-point scale, ranging from strongly disagree (rated 1) to strongly agree (rated 5). All information related to Chinese version of MHLC presented here, for example, validity and reliability, are based on the five-point scale.

Nutritional Status

For nutritional outcomes, the MNA questionnaire which contained diet and personal histories and anthropometrics measurements, was used. It provides a simple, noninvasive procedure for the assessment of nutritional status. In fact, most authors agree that it can be effectively employed to evaluate and identify elderly individuals at risk for malnutrition (Chan et al., 2002; Chien, Hunag, Liao, Chen, & Shieh, 2003; Hsu, 2003; Tsai et al., 2004). According to the pilot study, however, the score of the MNA scale for participants showed a ceiling effect; the average score for the participants was 26.03, with a range from 15.50 to 29.50 (*SD* = 3.38). Moreover, the categorical rating yielded a low variance among the items, and a low internal consistency reliability was found (Cronbach's alpha = .73). Consequently, to increase the accuracy and variation of the nutritional status assessment, the biochemical indicator of albumin level was added in the main study, and additional analyses were conducted using albumin as the nutritional outcome.

The MNA scale. The MNA scale was developed in the early 1990s through the collaboration of the Toulouse University Hospital in France, the Clinical Nutrition

Program of the University of New Mexico in the United States, and Nestle Research Center in Switzerland (Guigoz et al., 1996; Vellas et al., 1999). In the beginning, the MNA was developed for elderly populations in clinics, nursing homes, and hospitals, or for those who were frail for reasons other than age (Garry & Vellas, 1999). Today, however, the MNA is applied to the nutritional assessment of general populations of elderly persons (Guigoz et al., 1996).

The 18 items of the MNA scale rate both objective and subjective nutritional information, as well as anthropometric measurements. The 15-item self-administered questionnaire elicits a global assessment (seven questions related to recent weight loss, mobility, lifestyle, medication, presence of pressure sores or ulcers, and psychological and neuropsychological health), a dietary assessment (six questions related to percent changes in appetite, meals per day, food and fluid intake, and autonomy of feeding), and the participants' self-assessment of health and nutritional status (two items for self-perception of health and nutrition). The three items for anthropometric measurements provide the body mass index (BMI), mid-arm circumference (MAC), and calf circumference (CC) (Guigoz et al., 1996). The total MNA score is the sum of the scores from all 18 questions, for a range from 0 to 30 points. Individuals with a score below 17 are considered malnourished, whereas those with a score of $\geqq 17$ to < 23.5 are considered at risk of malnutrition, and a score of 23.5 or greater categorizes individuals who are well nourished (Garry & Vellas, 1999; Guigoz et al., 1996; Guigoz et al., 2002).

To establish psychometric properties, in its initial phases of development, the MNA was used in three studies of healthy and frail elderly persons. The results of all three studies showed strong correlations between the MNA score and dietary intake and

between the MNA score and the plasmatic transthyretin marker of nutritional status (Guigoz et al., 1996). Moreover, a developmental study was conducted to test the discrimination potential of the MNA scale, and the outcome showed that the MNA questionnaire could accurately distinguish between elderly patients with adequate nutrition and elderly patients who were malnourished or at risk of malnutrition. The sensitivity and specificity for the MNA scale were 96% and 98%, respectively, and an acceptable inter-rater reliability has been reported (Kappa coefficients of .65 to .42) (Guigoz et al., 1996). Moreover, the MNA score has significant correlations with anthropometric factors (Soini, Routasalo, & Lagstrom, 2004), mortality in geriatric patients (Beck, Ovesen, & Osler, 1999; Persson, Brismar, Katzarski, Nordenström, & Cederholm, 2002), the incidence of adverse clinical events during hospitalization (Donini et al., 2003), and the length of stay for hospitalization (Van Nes, Herrmann, Gold, Michel, & Rizzoli, 2001).

The MNA has been applied in studies of elderly Chinese. For example, researchers used the Chinese version of the MNA for clinical participants and community-dwelling elderly; and they found that the MNA score is significantly correlated with BMI, albumin levels, ADL, and MMSE (Chan et al., 2002; Chien et al., 2003; Hsu, 2003). After pilot testing the MNA scale, the internal consistency of Chronbach's alpha for the MNA scale was .73. Feedback from the participants suggested that providing a cup for helping participants determine the amount of water that they drink during the day, was needed for the main study.

To assess the three items of anthropometry measurements in the MNA scale precisely, the WHO (1995, 2004) guidelines were followed. All anthropometric

measurements were taken at least twice by the same researcher, and the reported values were the means of the repeated measurements (Eveleth et al., 1998; Vellas et al., 2000).

First, the BMI was determined as the weight in kilograms divided by the square of the height in meters (kg/m^2). For measuring weight, the calibration scale was used. Participants were void and remove their shoes but continue to wear indoor clothing. Weight was read while the individual stands still on a mechanical weighing scale, and the weight was recorded immediately to the nearest 100 gm. Height measures were taken with participants standing without shoes, feet together, back and heels against the upright bar of the height scale, head approximately in the horizontal plane ("look straight ahead"), and standing erect ("stand up tall" or "stand up real straight"), with some assistance and demonstration given when necessary. The height-measuring equipment consists of a vertical bar with a steel tape attached to a level platform. Attached perpendicularly to the vertical bar is a horizontal bar, which is brought down snug to the participant's head. The individual was asked to inhale deeply and maintain a fully erect position. The movable headboard was lowered onto the topmost point of the head with sufficient pressure to compress the hair. Participants were measured to the nearest 0.1 cm.

The MAC was measured at the upper right-arm midpoint. The midpoint is located after bending the right arm to a 90-degree angle at the elbow and placing the forearm palm down across the trunk. For the MAC measurement, the participants were assisted in removing their clothes or rolling up their sleeves to uncover their upper arm. The participant stood with the arms extended laterally for this measurement. The upper arm should be approximately parallel to the trunk while the participant bends the arms at a right angle with the palm up. Using an inelastic, flexible tape, the researcher identified

and marked the midpoint of the arm, halfway between the tip of the acromion process and the tip of the olecranon process. The skin was marked at this point before the arm was repositioned for the circumference measurement. The researcher's hand was placed through the loop of the tape measure. The tape, at least 2 meters long, was placed at the marked midpoint and pulled just snug around the arm, but not so tight that the tissues were compressed. The MAC was measured to the nearest 0.1cm.

Last, the CC was measured with the person seated in a chair. It was important that the leg was supported so that the knee and ankle were each bent to a 90-degree angle. The participants were helped in rolling up their trousers to uncover their calves. This measurement was taken with an inelastic flexible tape. Kneeling at the side of the calf, the researcher positioned a loop of the measuring tape around the calf. The tape was placed around the calf, and the loop of tape was moved up and down the calf to locate the largest circumference. The loop should not be so tight to compress the tissues. The CC was measured to the nearest 0.1cm.

Biochemical indicator. Biochemical assessments have played important roles in nutrition measurements (Charney, 1995; Howard, 1996). Tissue stores are gradually depleted during a nutrition deficiency. The depletion results in reductions in the levels of nutrients in reserve stores and body fluids, in the levels of metabolic products, and in the activity of nutrient-dependent enzymes (Kuczmarski & Kuczmarski, 1998). The most reliable biochemical indicators for diagnosing malnutrition in older adults include red blood cells, hemoglobin, serum albumin, serum transferrin, transthyretin, serum cholesterol, total lymphocyte count, among others (Charney, 1995; Howard, 1996; Kuczmarski & Kuczmarski, 1998; Roe, 1990; Stotts & Bergstrom, 2004). As Dwyer et al.

(1993), Hudgens, Langkamp-Henken, Stechmiller, Herrlinger-Garcia, and Nieves (2004) suggested, for well elderly persons, a serum albumin levels test is useful in the biochemical assessment of nutritional status.

For this study, the biochemical indicator used for nutrition assessment was albumin levels. A serum albumin level of less than 3.5 gm/dl is considered an indicator of an elevated risk of poor nutritional status (Omran & Morley, 2000). In Taiwan, the government provides annual health evaluations for the elderly for free, and that evaluation includes biochemical assessments of albumin levels. After annual evaluation, an evaluation data sheet was sent to the elderly from the government. After the participants agreed to the terms of the study, the researcher accessed their health records to gather data on albumin levels from their health evaluations data sheet.

Pilot Study

The pilot study focused on the translation of the CDSE (Phase 1) and on the evaluation of the psychometric properties and applicability of the CDSE, MHLC, and MNA for the Taiwanese elderly participants (Phase 2). Both phases are described in the following sections.

Phase 1: The CDSE Translation

Brislin's model for translating and back-translating was used for translating the CDSE (Brislin, 1970, 1986; Brislin, Lonner, & Thorndike, 1973). A group of experts was invited to assist in the translation (see Appendix I), and those experts and the procedure used were as follows. (a) Source language (SL) of English to the target language (TL) translation: A native Chinese speaker who was a doctoral candidate in nursing, knowledgeable in self-efficacy theory, familiar with instrument development, and fluent

in English forward-translated the CDSE scale into Mandarin Chinese. (b) TL evaluation: The Chinese version of the CDSE scale was reviewed by a Chinese monolingual reviewer who was a gerontology nursing professional. (c) TL to SL blind back-translation: An assistant professor in nursing, fluent in English and unaware of the source-language version of the instrument, was invited to back-translate blindly. (d) Comparison of original and back-translation versions: Two native English speakers, both of whom were doctoral students in nursing and familiar with self-efficacy theory and instrument development, compared the original version with the back-translated English version item by item to evaluate the semantic equivalence. (e) Committee review of items: Because the most appropriate sources of information are members of the target population (Grant & Davis, 1997; Herdman, Fox-Rushby, & Badia, 1998), one bilingual elderly person was invited to serve on the committee. Members who were healthcare professionals included two nutritionists, two assistant professors in nursing, and one doctoral students studying gerontology nursing, were invited to review pairs of items in the SL and the TL and assess their wording, meaning, grammatical structure, comparability of concepts, and format (see Figure 3).

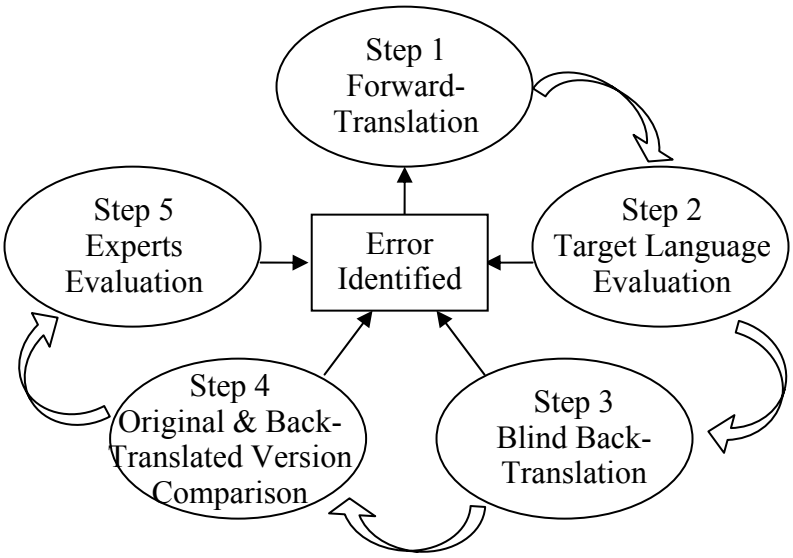


Figure 3. The Brislin's model for translating and back-translating.

Brislin's model of translation is recommended as the most reliable method of developing an equivalent, translated instrument. A central concern of any translation process, however, is the generation of a linguistically and culturally equivalent of the original instrument. In an investigation into the use of Brislin's model to adapt the CDSE scale to a target population of Taiwanese elderly persons, some issues and difficulties were found that affected the translation process. Those challenges relate to differences in culture, language, and educational levels between the SL and TL populations.

Culture. One of the most obvious factors that influences the translation process is cultural differences between SL and TL speakers. In Western countries, people have independent views of the self that emphasize the separateness, uniqueness, and internal attributes of individuals, whereas Asians hold interdependent views of the self that stress connectedness, social context, and relationships (Markus & Kitayama, 1991). Values in Chinese, for instance, are conformity to the expectation of others, concern about the results of one's actions on other people, and feelings of interdependence with one's family (Triandis, 1989). Thus, for Taiwanese elderly people, one's own self is an extension of the collective self, and the identity of self is defined more in terms of relationships. For example, in Taiwan, the self and the relationship between self and the whole family are almost indistinguishable. For that reason, unless the interviewer mentions a target person, the elderly participants in Taiwan would tend to think that self-efficacy is related to the collective efficacy of the whole family. Therefore, it is necessary to add the target person "I" to every item to emphasize that the focus is on self-efficacy and not on collective efficacy.

Language. Language differences result in the most obvious distortions in a translated questionnaire (Flaherty et al., 1988; Herdman et al., 1998; Hui & Triandis, 1985). Herdman et al. (1998) mentioned the importance of expressing the original message as accurately, clearly, and naturally as possible. Even so, linguistic differences inevitably affect the translation process. For instance, Item 3 contains the term "busy or in a rush." In Chinese, the meanings of "busy" and "in a rush" are the same, and they are always represented by the same word-匆忙. Additionally, in Chinese, "snack" has two meanings: one is the food between meals when people feel hungry-點心, particularly the light meals that people serve workers or sick persons. Another meaning, one relating to ordinary nibbling during the day, has negative connotations associated with an unhealthy life style-零食. In Item 9 of the CDSE scale, it is suggested that, to clarify the meaning of "snack" in the TL, both meanings was provided. Moreover, in the same item, the phrase "during the day or evening" is not an accurate expression in the Chinese language. In Western societies, evening is from 6 to 10 o'clock, and nighttime is after 10 o'clock. In Chinese society, however, most people divide a whole into its two contrary components, for example, day and night, and that practice governs the Chinese way of life (Chang, 1974; Chen, 2001). Hence, the elderly in Taiwan might have no clear idea about the meaning of "evening." As Herdman et al. (1998) argues, many cultures do not share the same chronological conceptions of time.

Educational level. Different levels of literacy influence the ability to answer the questionnaire (Herdman et al., 1998). Although the CDSE scale is a simple and easy-to-read scale, in the development stage of the scale, the test population was a group of

cardiac patients aged from 32 to 79 years (M = 62), and the mean education level was 13 years, with a range of 4 to 22 years (Hickey et al., 1992). This population background was quite different from that of the target population of Taiwanese elderly with lower educational levels. Studies conducted in Taiwan, for example, revealed that 20% to 70% of elderly people are illiterate, and even when the elderly are literate, fewer than half have a sixth-grade education (Chau, Gau, & Lin, 2004; Department of Health, 2004; Hsu et al., 2003). Furthermore, the readability of the CDSE scale was checked using Microsoft Word, and the scale was found suitable for a person with a 6.20 grade level of education. As a result, elderly persons in Taiwan reported that they had difficulty understanding terms like "the ideal body weight" and "healthy diet." Undoubtedly, the SL and TL versions need to be as similar as possible within a reasonable effort (Bracken & Barona, 1991; Brislin, 1970); however, based on Herdman et al. (1998), the elderly in Taiwan need clear instructions or explanations for difficult terms.

After the translation process of the CDSE scale, some items in the English version of the CDSE scale were modified slightly to match the changes in the Chinese version due to differences in cultural, language, and educational levels among the SL and TL populations. For example, in item 9, the phrase "during the day or evening" was changed to "during the day or night" in order to fit the chronological conceptions of time for the elderly of Taiwanese. Finally, the feedback from the original developer, Dr. Hickey, was obtained (M. L. Hickey, personal communication, October 16, 2006), and she agreed to the word modification according to the results of the scale adaptation process (see Appendix F).

Phase 2: Pilot Testing

The pilot study also evaluated the psychometric properties and the applicability of the CDSE, the MHLC, and the MNA for Taiwanese elderly. First, the instrument packet was administered to a panel of six experts with knowledge of, and experiences with, elderly nutrition issues in order to obtain feedback on the appropriateness of the instruments for use with this age group. The review committee was composed of bilingual Taiwanese experts as shows above (see Appendix I). To facilitate the review process, the researcher designed an instrument review sheet to be used by the committee. Each expert rated the content relevance for each item on a four-point scale regarding representativeness, clarity, and comprehensiveness of the instrument items for use with the elderly population; and from those ratings, a content validity index (CVI) was derived.

Through discussions via telephone and e-mail exchanges among committee members, the preceding steps were repeated for items considered nonequivalent. After the responses on the instrument review sheet were analyzed, all instrument items were considered appropriate for the elderly and were therefore retained. Items were considered for deletion only if their CVIs were less than 3 (Flaherty et al., 1988; Lynn, 1986). That CVI criterion, calculated as the percentage of items that were rated as relevant, ensured that the content of the Chinese versions of the CDSE scale, the MHLC, and the MNA scale were valid (Lynn, 1986). Moreover, because all CVI items were greater than 3, no item was considered for deletion (Lange, 2002; Lynn, 1986).

After the integrity of the instrument was determined and approval was granted by the Institutional Review Board at the University of Texas at Austin, a pilot study was

carried out to explore the psychometric properties and the applicability of the Chinese versions of the CDSE, the MHLC, and the MNA scales. The pilot study explored issues of meaningfulness and understandability as well as time, cost, and skill estimations for the study. In addition, instrument acceptability to the potential participants was assessed. Study involvement for the participants was approximately 30 to 50 minutes.

Setting and sample. A convenience sample of 30 community-dwelling elderly participants in Northern Taiwan who met the inclusion criteria were recruited from June to July of 2006. Translated versions of the CDSE, the MHLC, the MNA, and demographic information sheet were completed. The criteria for selecting participants included (a) an age of 65 years or older, (b) noninstituionalized, (c) capable of ambulating, (d) an ability to communicate orally or in writing, and (e) availability to the researcher for 30 to 50 minutes of data collection. If the person had a severe health problems (e.g., advanced cancer), that person was excluded. For psychometric properties, a test-retest reliability was used to determine stability by administering the scales on two occasions separated by a time interval that was sufficient for researcher to assume that the variance being measured had not changed (Streiner & Norman, 2003). Moreover, Pedhazur and Schmelkin (1991) suggested that the interval between the two administrations be relatively short; therefore, three days were allowed to elapse in order to measure the random measurement error and not true changes for the CDSE, the MHLC, and the MNA scales.

Data collection. To recruit participants, the researcher invited elderly persons who were present at the community center. The potential participants were screened according to the inclusion criteria, and those who met the inclusion criteria were invited to

participate in the face-to-face interviews in the community-center office. In addition to the spoken invitations, the researcher explained the study, the participants' rights, the policy regarding confidentiality, and the benefits of participating. Next, the prospective participants signed consent forms if they agreed to join the study. If language or reading ability was an issue, the researcher read the consent form aloud. A copy of the consent form was given to each participant to keep.

The participants were interviewed to complete the demographic information sheet, the CDSE, the MHLC, and the MNA scales. For the test and retest, a room in a community-center office was chosen that provided a quiet environment and a convenient restroom. The participants were told that they could ask for a rest any time during the data collection process. To remind the participants to complete the second data collection for the test-retest reliability evaluation, the researcher gave the 10 participants a card and later a phone call to remind them of the second data collection session. The interviewer documented any problems during the administration of the questionnaires. At the end of the interview, each participant was asked to comment on the questionnaires and to identify any words or questions that were difficult to understand.

Data analysis. All data from the pilot study were coded, entered into a computer, and analyzed using the Statistical Package for the Social Sciences (SPSS 13.0 for Windows) program. The level of significance (α) was set at .05 for statistical analysis. Data were reviewed and double entered to ensure accuracy. Descriptive statistics (means and standard deviations for continuous data and frequencies and proportions for nominal data) were used to describe the sample and the CDSE, the MHLC, and the MNA data. For psychometric properties, the test-retest reliability was used for stability by

administering the scales on two occasions. Both Pearson's correlation coefficients and Spearman's rank order correlation coefficients were used to examine test-retest reliability for the instruments since the sample size was small. For consistency, Cronbach's alpha reliability test was conducted (Streiner & Norman, 2003). In addition, participants' responses and verbal feedback were used for a final revision of the Chinese versions of the instruments.

Findings. Thirty elderly participants completed the questionnaires via the interviews at baseline, and an additional 10 elderly participants completed it again after 3 days for test-retest reliability. The range time required for the interviews was 30 to 50 minutes. The average participant was 72.37 (*SD* = 6.50, range = 65 to 85 years) years of age, married (76.7%), and unemployed (97.0%). Almost half of the participants were illiterate (40%). Most of the participants lived with their families (96.7%); only one participant lived alone. As for health problems, most had more than one chronic disease (56.7%), but 13 persons reported that they had no chronic disease. In regard to chronic diseases, half of the participants (50%) reported they had heart disease.

The mean of the CDSE was 53.63 (*SD* = 8.28), which indicated that the nutrition self-efficacy was high in this sample. For the MHLC, the majority of control beliefs were internal. The means for the IHLC, the PHLC, and the CHLC were 20.83 (*SD* = 4.28), 16.90 (*SD* = 5.37), and 14.37 (*SD* = 5.26), respectively. Finally, for the nutritional status from the MNA score, the mean was 26.03 (*SD* = 3.38). Individuals with a score below 17 were considered malnourished, those with a score of 17 to 23.5 were considered at risk of malnutrition, and a score of 23.5 or greater indicated individuals who were well nourished (Garry & Vellas, 1999; Guigoz et al., 1996; Guigoz et al., 2002). Therefore, one elderly

participant was considered malnourished, four participants were at risk of malnutrition, and the majority of the sample (83.33%) scored were higher than 23.5, which categorized them as well nourished.

For reliability, the internal consistency, or Cronbach's alpha, for the CDSE and the MNA were .79 and .73. For the MHLC, the three subscales of the IHLC, the PHLC, and the CHLC were .80, .88, and .81, respectively. Although the internal consistencies for the three subscales were considered acceptable when they were greater than .70 (Lynn, 1985), it is worth noting that the internal consistency for the MNA was low. The reasons might relate to the categorical rating and the low variance among the items. Therefore, the addition of other nutritional measurements was suggested. Finally, for stability, the test-retest stability correlation coefficients for the CDSE and the MNA were .85 and .95, and for the IHLC, the PHLC, and the CHLC they were .85, .88, and .86, based on data from ten elderly participants. Because of the small sample size, Spearman correlations were calculated, with .95 and .92 for the CDSE and the MNA, and .70, .80, and .56 for the IHLC, the PHLC, and the CHLC, respectively. For test-retest stability, it was reasonable to demand stability measures greater than .50 (Streiner & Norman, 2003); however, the CHLC showed lower test-retest correlation coefficients when Spearman correlations (r = .56) were used. The reason for that difference might be that the CHLC is related to one's current feelings and might be easily changed by current life events (see Table 2).

Table 2

Summary the Characteristics and Psychometric Properties of Instruments

Instruments	Internal Consistency	Test-retest stability	Range	Interpretation
Cardiac Diet Self-Efficacy (CDSE) (16 items)	.79	.85	16 to 80	Higher scores indicate greater nutrition self-efficacy
Multi-Dimensional Health Locus of Control (MHLC) (18 items)				Higher scores reflect stronger endorsement of each subscale content area
IHLC (6 items)	.80	.85	6 to 30	
PHLC (6 items)	.88	.88	6 to 30	
CHLC (6 items)	.81	.86	6 to 30	
Mini-Nutritional Assessment (MNA) (18 items)	.73	.95	0 to 30	1. < 17: Malnourished 2. ≧17 to < 23.5: At risk of malnutrition 3. ≧23.5: Well nourished

Conclusion. The pilot study result showed that the mean age was 72.37 years. Most of the participants were married, illiterate, unemployed, and lived with their families. More then 50% of the participants in this study had at least one chronic disease, especially heart disease. The participants scored high in nutrition self-efficacy and internal control beliefs, and the majority of the participants were well nourished. For psychometric properties, the pilot study showed satisfactory validity and reliability for the Chinese version of the CDSE, the MHLC, and the MNA instruments for the elderly population in Taiwan. Taiwanese elderly participants suggested revising the contents slightly for better readability and cultural orientation. Thus, the data from the pilot study provided an important step in understanding elderly nutrition and related factors in Taiwan; the pilot study also provided information for a large-scale study of nutrition in Taiwanese elderly.

Procedure of Data Analysis

The objective of data analysis was to answer the research questions and interpret the findings. Data analysis included both quantitative (descriptive and inferential statistics) and qualitative (content analysis). For quantitative part, the overall level of significance was set at the alpha of .05 using SPSS Version 13. The following sections describe data management and data-analysis procedures for each research question.

Data Management

Data error checking and cleaning preceded data analysis, with all data being checked against assumptions of normality, homogeneity of variance (HOV), multicollinearity of variables, independence, and linearity. The frequencies and ranges of all variables were carefully screened for errors, and assumptions were evaluated. Missing

data were examined by the researcher to identify trends or possible reasons for omission. Individual elderly persons were included in the study if no more than 10% of their responses were missing on any given scale. For the omission items or any missing data, group means were substituted.

Data Analysis

Descriptive statistics, including means, ranges, standard deviations, frequencies, and percentages, were used to analyze the background characteristics and major variables, and calculation of the Cronbach's alpha of the CDSE, the MHLC, and the MNA scales were conducted to evaluate internal consistency of tools with the study sample. Furthermore, inferential statistics and content analysis were used to answer both of quantitative and qualitative research questions shown below.

Research question 1. To examine the relationships among background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, HLC, and nutritional status in a sample of Taiwanese elderly, point biserial correlation and Pearson Product Moment Correlation were used to describe the magnitude of the association.

Research question 2, 3, and 4. To explore the relationships among nutrition self-efficacy, HLC, and nutritional status, statistical analyses, the Pearson Product Moment Correlation Coefficient was obtained to describe the associations.

Research question 5. To determine what is the predictive relationship of background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, and HLC on nutritional status in a

sample of Taiwanese elderly, hierarchical multiple regression analyses was used. In addition, assumptions of regression were tested before performing regression analyses.

Research question 6. Lastly, a qualitative approach using content analysis was used to explore the final research question of how do Taiwanese elderly describe their eating patterns.

Protection of Rights of Human Subjects

Prior to data collection, the researcher contacted the director of the Public Health Bureau of the Yilan County government in Taiwan to obtain written permission for data collection in public health centers in Yilan County. To ensure that every step of the study is ethical and justified, the proposal was first submitted for review by the Institutional Review Board (IRB) for the Protection of Human Subjects at the University of Texas at Austin. After approval by the IRB, the researcher started collecting data.

Before the volunteer participants were handed questionnaires, each participant received information about this study directly from the researcher. The information included the purpose and procedure of the study and the confidential nature of the study. After the interested participants agreed to participate in the study, the consent form was read to them, and then they signed the form (see Appendix C). If language or reading ability was an issue, the researcher read the consent form aloud for the participant. A copy of the consent form was given to the participant to keep. A statement was provided that the research was voluntary and that refusal to participate or a decision to withdraw at any time involved no penalty or loss of benefits to which the participant was otherwise entitled. During the data collection, a short break was taken when the participants appear fatigued or if they request a break.

No invasive procedures were employed in the study, and the data obtained did not expose the participants to any psychological, social, financial, or legal risks. Two minimal risks might relate to this study. First, the participants might feel tired or inconvenienced because of the 30 to 50 minutes needed to fill out the questionnaires. To avoid this, participants were told that they could rest at anytime, and they were not pressured to complete the questionnaires within a minimum time limit. The second risk was related to the content of the questionnaires. Participants might feel uncomfortable about answering some items. To avoid this, the participants were told that they could omit items that make them feel uncomfortable. However, the risks to the participants were minimized by the use of procedures consistent with sound research design that did not necessarily expose participants to risks.

Although the participants in this study received no tangible compensation, the benefits of participating included the following: (a) referral to a nutritionist if the participant's nutritional status was inappropriate; and (b) learning about nutrition from the information obtained during the interview or questionnaires or knowledge otherwise gained during the data collection process. To achieve this, the researcher reviewed results with participants, including MNA score and albumin levels.

All data obtained from participants were assigned code numbers, as opposed to the participants' names, addresses, and telephone numbers. All information identifying participants were held in the strictest confidence in a locked file and were known only to the researcher. Participants were informed that the study results were presented as group data only, and no individual was identified at any time throughout the study.

Summary

A correlational, cross-sectional research design with face-to-face interviews was used to examine the relationships of nutrition self-efficacy, HLC, and nutritional status; and qualitative approach using content analysis also obtained to understand the eating patterns among Taiwanese elderly persons. A minimal sample size of 135 Taiwanese elderly participants was needed for this study after power analysis, and finally, 156 were recruited by random selection from public health centers in two districts of Yilan County in Taiwan. After the participants agreed to the terms of the study, data collection was started. Face-to-face interviews were conducted independently with each participant and the demographic information sheet, the CDSE, the MHLC, and the MNA scales were completed. A pilot study was began earlier that translated the CDSE and evaluated the psychometric property and the applicability of the CDSE, MHLC, and MNA scale for the Taiwanese elderly. The results of the pilot study were discussed in this chapter. Both of quantitative and qualitative data analyses were used to examine the relationships of the major variables and to answer the research questions. Overall, this chapter has presented the population and sample, the procedures for data collection, the instrumentation, the procedures and results of the pilot study, the data analysis procedures to be used for the proposed study, and the procedures taken for the protection of human subjects.

CHAPTER 4

PRESENTATION OF THE FINDINGS

The purpose of this study was to explore the relationships among background characteristics, nutrition self-efficacy, health locus of control (HLC), and nutritional status of the Taiwanese elderly. A research model provided the framework for the study, and research questions guided the data analysis process. The model suggested that background characteristics, nutrition self-efficacy, and HLC influence the nutritional status of Taiwanese elderly. To present the results of the study, this chapter describes the management of the data, characteristics of the sample, descriptive statistics for the major study variables, and the psychometric testing of instruments. In addition, the chapter presents the findings of the quantitative analysis as they apply to the research questions. The overall level of significance for statistical tests was an alpha of .05, and the software package was SPSS Version 13. A sample of 156 individuals from two public health centers in Yilan County in Taiwan was recruited for data analysis. Finally, the chapter describes the findings of a qualitative, or content, analysis of participant's responses to an open-ended research question.

Data Management

Missing Values

Individual elderly persons were included in the study if no more than 10% of their responses were missing on any given scale. In those cases, group mean were substituted for the individual missing score. Because the questionnaires were administered in face-to-

face interviews, there was little missing data. Even though a trained nurse asked potential participants to bring their 2007 annual health evaluation data sheets to the interview, which were followed by phoned reminders, eight participants forgot to bring their data sheets to the interview (five from Public Health Center 1 and three from Public Health Center 2). The researcher had to call those individuals after the interview to collect their health evaluation data directly. Four participants (2.56%) (three from Public Health Center 1 and one from Public Health Center 2) lost their data sheets, and group-mean values were used for data in their cases.

Response Rate

As described in Chapter 3, two district public health centers, randomly selected from ten such centers in Yilan County in Taiwan, were the sites for obtaining sample data from participants. A total of 220 potential participants were randomly selected from a list of persons completing the 2007 annual health evaluations. After the potential participants were screened according to inclusion and exclusion criteria, 156 participants agreed to provide data (80 from Public Health Center 1 and 76 from Public Health Center 2). Thus, data for 156 cases were obtained for analysis, for a response rate of 70.91% (see Table 3).

Table 3

Drop-Out Participants and Percent of Valid Responses by Total Sample

Drop-out Reasons	Health center_1 (n = 80)	Health center_2 (n = 76)	Whole sample (N = 156)
No. of invitation letters mailed	110	110	220
No. of trained nurse phone calls	105	102	207
Exclusion reasons			
Wrong phone number	5	8	13
Not met the inclusion criteria			
Obese (BMI $\geqq$27 kg/m^2)	22	18	40
Incapable of ambulating	0	2	2
Unavailability for 30 to 50 minutes of data collection	2	1	3
Feel sickness and have doctor's appointment	0	2	2
Didn't offer a reason	1	3	4
Total number of exclusion	30	34	64
Percent of valid responses	72.73	69.09	70.91

Characteristics of the Sample

For the determination of the background characteristics of the sample, the means, standard deviations, and ranges were computed for continuous demographic variables, and frequencies and percentage were computed for categorical variables. The results are presented in Tables 4 and 5.

This sample were primarily male (60.9%), with a mean age of 72.29 (age range = 65 - 88, *SD* = 5.22). Most of participants were Taiwanese (*n* = 155, 99.4%), with Taiwanese folk religion (Taoism) (*n* = 148, 94.9%), and were married (*n* = 125, 80.1%). The average number of years of education among the participants was 3.96 (range = 0 - 16, *SD* = 4.09), with an equal proportions of literate and illiterate (80 vs. 76). Most of the participants reported they were not employed outside the home, either because they were homemakers or retired (*n* = 130, 83.33%). Regarding their incomes, most participants (*n* = 125, 80.1%) received monthly subsidies from the government, and all participants (100 %) reported that their income met their needs. Most of participants lived (94.2%) and ate (92.9%) with their family. The range of the number of other family members in a household was from 0 to 18, with a mean of 3.03 (*SD* = 2.77) and a median of 2; which was similar to the number of other people eating together.

Measures of biochemical indicator showed that the majority of participants had normal range of albumin levels (*M* = 4.45 gm/dl, *SD* = .25). The range of the body mass index (BMI) for all of 156 participants was from 15 kg/m^2 to 26.9 kg/m^2 (*M* = 23.83 kg/m^2, *SD* = 2.41). Based on Taiwanese obesity guidelines (Department of Health, 2004), 3.2% were in the underweight range (≤ 18.5 kg/m^2), and 52.6% were in the overweight range (24 kg/m^2 to 26.9 kg/m^2). Importantly, because obesity was one of the exclusion

criteria for this study, during recruitment potential participants who had BMIs equal to or greater than 27 kg/m^2 were excluded (n = 40) (see Table 3). Of all potential participants (N = 220) for this sample, the portion of obese elderly persons was 18.19%.

Health problems and medications used are listed in Tables 4 and 5. The participants were questioned in respect to their past and current chronic diseases. The number of current chronic diseases reported was from 0 to 4, with a mean of .82 and a median of 1 (SD = .82), which was similar to the number of chronic diseases reported in the past health histories. On average, people on Western oral medications took 1.18 types of pill per day, with a range of 0 to 6 and a median of 1 (SD = 1.00). In addition, 32 participants said that they took Chinese medicines, supplements, or both for their health.

Finally, to report the overall description of their health, in response, the mean health score for the subjects was 3.17 (SD = .81) based on a scale of 1 (very poor) to 5 (excellent), and the majority reported it worse than it was the previous year (n = 84, 53.9%). Most of participants had no problem with chewing (66.7%), swallowing (98.1%), tasting and smelling (99.4%), and vision (76.3%). One-third (n = 49) of the participants reported that they did not receive any information at all about healthy eating. Moreover, most of the participants (82.7%) perceived that they did a poor or fair job in taking care of their nutritional needs (see Appendix J).

Table 4
Background Characteristics of the Sample (N = 156)

Items	*N*	*%*	*Mean*	*SD*	*Range*
Age			72.29	5.22	65-88
65–69	53	34.0			
70–74	55	35.3			
75–79	31	19.9			
≧80	17	10.9			
Gender					
Male	95	60.9			
Female	61	39.1			
Province					
Taiwanese	155	99.4			
Mainlanders	1	.6			
Religion					
Folk religion (Taoism)	148	94.9			
Other religion	8	5.1			
Marital status					
Never married	1	.6			
Married	125	80.1			
Cohabit	3	1.9			
Widowhood	24	15.4			
Divorced	3	1.9			
Employment status					
Full time	13	8.3			
Part time	13	8.3			
Retired	77	49.4			
Housewife	53	34.0			
Income from					
Work or saving	93	59.6			
Wife / husband	4	2.6			
Children	68	43.6			
Subsidy from government	125	80.1			
Income adequacy					
Yes	156	100			
Not	0	0			
Education (years)			3.96	4.09	0-16
None	72	46.2			
Elementary school graduate	60	37.97			
≧Junior high school	24	15.4			
Literacy					
Illiterate	76	48.7			
Literate	80	51.3			

Note. A participant might have more than one income support.

Table 4

Background Characteristics of the Sample (N = 156) (Con.)

Items	*N*	*%*	*Mean*	*SD*	*Range*
Living arrangement					
The number of other people living together			3.03	2.77	0-18
Living alone	9	5.8			
Live with spouse/significant other only	56	35.9			
Live with spouse and children / grandchildren	84	53.8			
Live with other	7	4.5			
The number of other people eating together			2.90	2.70	0-18
Eating alone	11	7.1			
Eat with spouse/significant other only	55	35.3			
Eat with spouse and children / grandchildren	85	54.5			
Eat with other	5	3.2			
Albumin levels			4.45	.25	3.4-4.5
BMI			23.83	2.41	15-26.9
≤18.5 (Underweight)	5	3.2			
18.6-23.9 (Normal)	69	44.2			
24-26.9 (Overweight)	82	52.6			
Medication use (western type)			1.18	1.0	0-6
0	41	26.3			
1	64	41.0			
2	39	25.0			
3	9	5.8			
4	2	1.3			
6	1	.6			
Medication use (others)					
Chinese medicine	15	9.6			
Supplement	17	10.9			

Table 5

Background Characteristics of the Sample - Chronic Diseases (N = 156)

Items	*Currently*					*Ever Been*				
	N	*%*	*Mean*	*SD*	*Range*	*n*	*%*	*Mean*	*SD*	*Range*
Number of disease			.82	.82	0-4			1.27	1.00	0-4
0	62	39.7				38	24.4			
1	66	42.3				60	38.5			
2	23	14.7				38	24.4			
3	4	2.6				18	11.5			
4	1	.6				2	1.3			
Type of disease										
Cancer	0	0				3	1.9			
CVA	1	.6				4	2.6			
Heart disease	18	11.54				29	18.6			
Diabetes	26	16.67				28	17.9			
Respiratory disease	4	2.56				6	3.8			
Renal disease	1	.6				4	2.6			
Liver disease	6	3.85				13	8.3			
Hypertension	53	33.97				60	38.3			
Arthritis	16	10.26				34	21.8			
Injury	0	0				17	10.6			

Note. A participant might have more than one chronic disease.

Descriptive Statistics for Major Variables

According to the conceptual framework (see Figure 1), the nine major variables in the study were age, gender, educational level, living arrangements, health problems and medications, nutrition self-efficacy, HLC, and nutritional status. Before addressing the research questions, the researcher performed a preliminary assessment of the ranges, means, standard deviations, skewness, and kurtosis (see Table 6) of the major variables. In addition, the data were examined for outliers and for normal distribution. The background characteristics were presented previously; however, nutrition self-efficacy, HLC, and one of the nutritional status, called Mini-Nutritional Assessment (MNA), received focus in this section.

In regard to living arrangements, only 9 participants (5.8%) lived alone and 11 participants (7.1%) ate alone, so that the remaining participants lived and ate with their families. Moreover, the number of other people living together and the number of other people eating together were similar and highly correlated ($r = .95$, $p < .01$). Therefore, the number of other people living together was used alone to analyze how families influenced the nutritional status of the elderly in Taiwan. The number of years of education was used to indicate educational level. Moreover, because the literature review showed that chronic diseases and medications used both influence nutritional status (Callen & Wells, 2003; Roe, 1985), and because those two indicators are both continuous variables, the health problems and medications of the participants were analyzed by adding current chronic diseases and medications used together. Finally, for measuring nutritional status, a nutritional analysis using the MNA scale which contained diet and personal histories and

anthropometrics measurements was obtained, and a biochemical indicator of albumin levels was calculated.

Table 6

Descriptive Statistics for Major Variables (N=156)

Variables	*N*	*%*	*M*	*SD*	*Range*	*Skewness*	*Kurtosis*
Age (years)			72.29	5.22	65-88	.67	-.07
Gender							
Male	95	60.9					
Female	61	39.1					
Education (years)			3.96	4.11	0-16	.57	-.54
Living arrangements			3.03	2.77	0-18	1.81	5.47
Health problems and medications			1.99	1.71	0-8	.88	1.04
Nutrition self-efficacy			50.99	9.57	30-71	-.15	-.88
HLC							
IHLC			20.81	4.86	11-30	-.05	-.89
PHLC			21.42	4.11	11-28	-.44	-.04
CHLC			16.29	4.04	7-27	.38	-.05
Nutritional status							
MNA score			25.79	2.79	17.5-30	-1.04	.39
Albumin			4.45	.25	3.4-4.5	-.02	2.45

Nutrition Self-Efficacy

In this study, the Cardiac Diet Self-Efficacy (CDSE) scale was used to examine nutrition self-efficacy in regard to the healthy-eating behaviors of the participants. Table 7 presents the distribution of the CDSE scores and the descriptive statistics for the scale results. The overall average of the CDSE score for the sample was 50.99 (*SD* = 9.57), with a range from 30 to 71, which indicated that the participants were moderately confident in their ability to perform healthy dietary behaviors. Moreover, the results showed that the participants had higher eating self-efficacy in the following categories: increasing fiber and vegetable, cutting out unhealthy snacks, staying on a healthy diet when eating at a restaurant or otherwise away from home. They had lower confidence in their ability to acquire healthy eating behavior skills, including how to eat, how to cook, how to select and purchase healthy foods, and how to control and maintain their ideal body weight.

Table 7

Descriptive Statistics for the CDSE, the HLC, and the Nutritional Status of the MNA score

Scales and subscales	Possible scale range	Sample scale range	*M*	*SD*
Overall nutrition self-efficacy	16-80	30-71	50.99	9.57
Increasing fiber and vegetable	1-5	2-5	4.01	.71
Reducing fat and cholesterol	2-10	4-10	6.95	1.42
Reducing sugar	1-5	1-5	3.40	1.13
Resisting relapse	7-35	10-33	22.59	4.90
Behavior skill	5-25	5-23	14.04	3.73
Health locus of control				
PHLC	6-30	11-28	21.42	4.11
IHLC	6-30	11-30	20.81	4.85
CHLC	6-30	7-27	16.29	4.04
The MNA	0-30	17.5-30	25.79	2.79
Global assessment	0-9	3-9	8.46	.97
Dietary assessment	0-12	7-12	10.50	1.07
Anthropometric measurements	0-5	0-5	4.31	1.12
Subjective assessments	0-4	0-4	2.52	1.17

Note. The order of the behavior areas of the nutritional self-efficacy, the subscales of the HLC, and the areas of the MNA scale was ranked from high to low for each score.

Health Locus of Control

The Multidimensional Health Locus of Control scale (MHLC) was used to assess the health locus of control in this study. The MHLC scale measures three separate dimensions of health locus of control: internal (IHLC), chance (CHLC), and powerful others (PHLC). Higher scores on the three subscales indicated greater beliefs in the influence of internality, chance, or powerful others with respect to health status. The sample scored a mean of 20.81 (*SD* = 4.85) on the IHLC, 16.29 (*SD* = 4.04) on the CHLC, and 21.42 (*SD* = 4.11) on the PHLC (see Table 7).

Nutritional Status According to the MNA Score

The MNA is an 18-item scale that measured the nutritional status of the participants in terms of diet, personal history, and anthropometrics. The mean scores and the ranges of scores varied among the items of this scale because the item scales varied from 2 points to 4 points. In each case, however, higher scores indicated a better nutritional status. The average level of nutritional status as measured by the MNA was 25.79 (*SD* = 2.79) with a range of 17.5 to 30 (see Table 7). Based on that assessment, no subjects in the sample population were considered malnourished, 17.9% (*n* = 28) participants were found to be at risk of malnutrition (borderline), and 82.1% (*n* = 128) were well-nourished. From the results, the participants had higher scores on neuropsychological problems, a healthy life style, full meals eat daily, mobility, mode of feeding, and living independently. On the other hand, participants had lower scores for management of their fluid and protein intake.

Psychometric Testing of Instruments

The following three instruments were used in this study: (a) the CDSE scale, (b) the MHLC scale, and (c) the MNA scale. The instrument items provided nominal, ordinal, and interval data, and the formats of the items were mainly closed-ended. Descriptive statistics of the instruments and the results of psychometric testing of the scales are discussed below, and the scales analyses are also presented in Appendix J.

The internal consistency of the CDSE for the sample in this study was evidenced by an acceptable coefficient alpha of .88, which was higher in the final study than in the pilot. The item-to-total correlations for this scale ranged from .24 to .72. The MHLC was used for measuring health locus of control. For this sample, the Cronbach alpha reliability coefficients for the three subscales of IHLC, PHLC, and CHLC were .93, .87, and .76, respectively. The reliability values for these three subscales were similar to those in the pilot study results. The item-to-total correlations for the MHLC scales ranged from .71 to .85, .43 to .84, and .19 to .74 for the IHLC, PHLC, and CHLC, respectively. A Cronbach's alpha score of .65 was computed for the MNA score. That score was marginally acceptable, and the item-to-total correlations for the MNA scale ranged from -.08 to .52. A possible reason for the low internal consistency is that most of the items in the scale were categorical and permitted only low variability from one item to another. Moreover, the elderly in this sample were mostly healthy, so that the score for each item of the MNA was high, which also contributed to the low inter-item variability.

Analysis of Quantitative Data

This section presents the findings related to the five research questions that motivated this study. In so doing, the section provides insights into the relationships

among selected background characteristics, nutrition self-efficacy, HLC, and nutritional status in the Taiwanese elderly. To answer the research questions, correlation and regression statistical techniques were used to analyze data obtained from the 156 participants, with a significance level set at an alpha of .05. For outcome variables, the total MNA score and the albumin levels were included as measures of nutritional status.

Because correlation and regression were estimated by using the maximum likelihood method, the data required normal distribution (Stevens, 1999). Hence, prior to the statistical analysis and inferential testing, the assumptions of normal distribution were tested for the major variables with continuous data (age, educational level, living arrangements, health problems and medications, nutrition self-efficacy, HLC, and nutritional status). First, two outliers for health problems and medications were detected with standardized *z* scores greater than ± 3 *SD* (Munro, 2005). As Munro (2005) emphasized, however, outliers should not be automatically deleted without further consideration. In this study, analysis with and without the outliers produced comparable results; therefore, the outliers were retained. For normality testing, histograms and Q-Q plots were obtained, and the results indicated that most variables had normal distribution; that is, their distribution was symmetrical and bell-shaped with one mode (Munro, 2005). In addition, the skewness and kurtosis of the variable were examined with satisfactory results (see Table 6).

Research Question 1

Research Question 1 was the following: What is the relationship among background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, HLC, and nutritional status? In the

sample of Taiwanese elderly, Pearson's product-moment correlation coefficients were calculated to ascertain whether relationships existed among the continuous variables (age, educational level, living arrangements, health problems and medications, nutrition self-efficacy, IHLC, PHLC, CHLC, MNA, albumin levels), and point-biserial correlation coefficients were calculated to find correlations between each continuous variable and a single categorical variable (gender).

Before attempting to answer Research Question 1, the assumptions for using correlation were tested. First, the assumption of the independence of observations was considered and found to be acceptable because the participants had provided data separately from one another during data collection. Consequently, data from any one participant were not related to data from other participants. Second, the assumption of linear relationships between variables was supported by an examination of scatter plots. The results representing the answer to Research Question 1 are presented in Table 8.

Age. Age was significantly and negatively associated with nutrition self-efficacy (r = -.24, p < .01) and both measures of nutritional status, the MNA score (r = -.32, p < .01) and albumin levels (r = -.19, p < .05). In other words, persons with advancing age tended to report lower nutrition self-efficacy and had lower scores on the MNA scale and for albumin levels.

Gender. Most variables were not significantly related to gender; only CHLC was positively correlated with gender (r = .17, p < .05). That result indicated that, if the elderly person was female, she tended to be more chance oriented in her health locus of control; after a t-test was performed to examine the difference between males and

females, the score for CHLC was significantly higher for females than males (t [154] = -2.11, $p < .05$ [two-tailed]).

Educational level. The results revealed that educational level was significantly and positively associated with nutrition self-efficacy ($r = .21$, $p < .01$) and the MNA score ($r = .25$, $p < .01$). Thus, the results indicated that the more years of education the elderly had, the greater was the nutrition self-efficacy they had, and the better MNA scores they had. To determine differences between literate and illiterate participants in nutrition self-efficacy and the MNA score, t-tests were performed. The results showed that literate participants had significantly higher scores on nutrition self-efficacy (t [154] = 2.49, $p < .05$ [two-tailed]) and on the MNA scale (t [154] = 3.44, $p < .01$ [two-tailed]).

Living arrangements. In this study, living arrangement based on the number of other people living together was not significantly related to nutrition self-efficacy, HLC, and nutritional status, MNA scores and albumin levels ($p > .05$). The lack of correlations indicated that, no matter how many people lived with the participant, that number was not related to his or her nutrition self-efficacy, HLC orientation, and nutritional status.

Health problems and medications. A significant bivariate relationship was found among scores on health problems and medications and nutritional status, as measured by the MNA scale ($r = -.18$, $p < .05$) and the albumin levels ($r = .16$, $p < .05$). Unexpectedly, for the elderly in this study, those with more chronic diseases and medications used had poorer nutritional status as indicated by MNA scores, but better in albumin levels.

Research Question 2

Research Question 2 was as follows: What is the relationship between nutrition self-efficacy and nutritional status in a sample of Taiwanese elderly? Because nutrition

self-efficacy and nutritional status were interval variables measured by scales, Pearson's correlation analyses were used to answer this research question. The results showed that the level of nutrition self-efficacy was significantly and positively correlated with the nutritional status indicated by the MNA scores (r = .23, p < .01) and albumin levels (r = .21, p < .01). Thus higher nutrition self-efficacy was related to better nutritional status (see Table 8).

Research Question 3

Research Question 3 was as follows: What is the relationship between HLC (IHLC, PHLC, CHLC) orientation and nutritional status in a sample of Taiwanese elderly? The Pearson's correlation coefficients used to describe that relationship are presented in Table 8. According to those results, IHLC was positively and significantly related to the MNA scores (r = .32, p < .01), and the CHLC was significantly and negatively related to the MNA scores (r = -.37, p < .01). Those results indicated that elderly persons with internal orientation tended to have better MNA scores, whereas participants with chance orientation tended to have lower scores on the MNA. Powerful-others orientation was not significantly related to nutritional status (p > .05), nor was albumin levels significantly associated with any HLC orientation (p > .05).

Research Question 4

Research Question 4 was as follows: What is the relationship between nutrition self-efficacy and HLC in a sample of Taiwanese elderly? The Pearson's product moment correlation coefficients used to describe that relationship are given in Table 8. According to the results, IHLC was positively and significantly related to nutrition self-efficacy (r = .47, p < .01), and CHLC was negatively and significantly related to nutrition self-

efficacy (r = -.19, p < .05). Those results indicate that elderly persons with IHLC tended to report higher nutrition self-efficacy, whereas participants with CHLC tended to have lower nutrition self-efficacy. PHLC was not significantly related (p > .05) to nutrition self-efficacy.

Table 8

Correlations among Background Characteristics, Nutrition Self-Efficacy, HLC, the MNA Score, and Albumin Levels (N = 156)

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1.00										
2. Gender	-.05	1.00									
3. Educational level	-.01	-.35**	1.00								
4. Health problems and medications	.06	-.06	.09	1.00							
5. Living arrangements	-.05	.06	-.04	-.04	1.00						
6. Nutritional self-efficacy	-.24**	.07	.21**	.10	-.01	1.00					
7. IHLC	-.12	.04	.15	-.12	-.03	.47**	1.00				
8. CHLC	.06	.17*	-.13	.06	-.14	-.19*	-.41**	1.00			
9. PHLC	.05	.01	-.02	.09	-.10	.01	-.10	.09	1.00		
10. The MNA score	-.32**	-.08	.25**	-.18*	.11	.23**	.32**	-.37**	-.15	1.00	
11. Albumin	-.19*	.12	.01	.16*	-.03	.21**	.14	-.00	-.10	.07	1.00

Note. ** Correlation is significant at the 0.01 level, * Correlation is significant at the 0.05 level, two-tailed

Research Question 5

The fifth research question was as follows: What is the predictive relationship of background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, and HLC on nutritional status in a sample of Taiwanese elderly? To answer that question, two independent hierarchical multiple regression tests were performed. Hierarchical multiple regression tests allow researchers to determine the order that variables are entered into a model based on logical or theoretical considerations (Munro, 2005). The interesting predictors of nutritional status were identified from the literature review instead of from the bivariate correlations among the study variables. Accordingly, the predictors of the nutritional status included background characteristics (age, gender, educational level, living arrangements, health problems and medications), nutrition self-efficacy, and HLC (IHLC, PHLC, CHLC).

To obtain an accurate interpretation of the regression analyses and to generalize the findings of the hierarchical regression to the general population, the researcher tested assumptions such as homoscedasticity, linearity, normality, and independence for regression analysis (Pedhazur & Schmelkin, 1991). Linearity and homoscedasticity were tested by comparing scatter plots of the residuals against the predicted values of dependent variables. The distribution of the residuals should scatter randomly around the line when residuals were 0 (Stevens, 1999). The normality assumption was tested by examining histograms and Q-Q plots of residuals. The assumption of independence was tested with Durbin-Watson values of Studentized residuals, wherein the values are between 0 and 4 (Norusis, 2005).

Multicollinearity poses problems when there are moderate to high intercorrelations among the predictors, which is often the case when several different measures are used as predictors (Stevens, 1999). Such problems include (a) the size of multiple correlation *R* is limited; (b) it is difficult to determine the importance of a given predictor; and (c) estimates of regression coefficients are unstable (Stevens, 1999). Two strategies were used in this study to prevent and detect multicollinearity.

First, an examination of the correlation matrix was performed to identify simple correlations among the predictors. The correlation coefficients among predictors in this study were not large, ranging from -.41 to .47 (see Table 8). Second, the tolerance value and the variance inflation factor (VIF) were used to detect instances of multicollinearity. According to Munro (2005), the tolerance value is "the proportion of the variance in a variable that is not accounted for by the other independent variables" ($1 - R^2$) (p. 288), and its value ranges from 0 to 1. If the tolerance value is too low, it will indicate a problem for the analysis. The VIF is the reciprocal of tolerance; that is, it is equal to $1/ (1 - R^2)$ (Stevens, 1999). Thus, variables with high tolerances have small variance inflation factors (Munro, 2005). The VIF for a predictor indicates whether there is a strong linear association between that predictor and all remaining predictors. A VIF value greater than 10 may indicate redundancy among the variables (Stevens, 1999).

Two hierarchical multiple regressions were obtained by using the simultaneous-entering procedure. The hierarchy of the variable entry was based on a literature review and the conceptual model used for the study. Therefore, in each regression analysis, the simultaneous-entering procedure for the entry of variables was used to determine whether any demographic variables (age, gender, educational level, living arrangements, or health

problems and medications) accounted for statistically significant variance on nutritional status in the first block. In the second block, four main variables (nutrition self-efficacy, IHLC, PHLC, CHLC) were tested. The following sections present the results of the regression tests regarding the nutritional status indicated by MNA scores and albumin levels.

The MNA score. The Durbin-Watson value for this regression analysis was 2.12, which indicated independence of the variables (Norusis, 2005). The scatter plot, histogram, and Q-Q plot showed that the assumptions of homoscedasticity, linearity, and normality of the data were met. The VIF values ranged from 1.07 to 1.27, which indicated that the equation was reasonable because the VIF was less then 10. The tolerance values were quite large, ranging from .79 to .93; thus, multicollinearity was not a problem.

Table 9 lists the results of the analysis. In Model 1, all background characteristics variables accounted for 18.4% of the variance of the MNA score (R^2 = .20, R^2_{adj} = .18, F [5, 150] = 7.65, p < .01). Together, age, educational level, and health problems and medications explained a significant amount of the variability among the participants' MNA scores (t = -4.19, p < .01, t = 3.36, p < .01, and t = -2.51, p = .01, respectively). Inclusion of the four predictors (nutrition self-efficacy, IHLC, PHLC, CHLC) explained a significant amount of the variability over that already explained by age, educational level, and health problems and medications (ΔR^2 = .11, F [4, 146] = 6.12, p < .01). The significant predictors in the final model included age, educational level, health problems and medications, and CHLC.

Table 9

Hierarchical Regression to predict the MNA score in Taiwanese Elderly (N=156)

	Model 1 [a]				Model 2 [b]			
	B	β	t	p	B	β	t	p
Age	-.16	-.31	-4.19	.00	-.14	-.27	-3.79	.00
Gender (0 = Male; 1 = Female)	-.04	-.01	-.10	.92	.09	.02	.21	.84
Educational level	.18	.26	3.36	.00	.14	.21	2.77	.01
Living arrangements	.21	.06	.81	.42	.15	.04	.59	.56
Health problems and medications	-.30	-.18	-2.51	.01	-.24	-.15	-2.10	.04
	R^2 = .20 R^2_{adj} = .18 F = 7.65, p < .01							
Nutrition self-efficacy					.01	.03	.38	.70
IHLC					.06	.12	1.25	.22
CHLC					-.18	-.26	-3.35	.00
PHLC					-.06	-.09	-1.25	.21
					R^2= .56 R^2_{adj} =.32 F = 7.54, p < .01 R^2 change = .11 F change = 6.12, p < .01			

Note. Dependent Variable: the MNA score. [a] Predictors: age, gender, educational level, living arrangements, health problems and medications. [b] Predictors: age, gender, educational level, living arrangements, health problems and medications, nutrition self-efficacy, IHLC, PHLC, CHLC.

Albumin levels. The Durbin-Watson value for this regression analysis was .30; although still within the normal range (from 0 to 4), which indicated that successive residuals were positively correlated (Norusis, 2005). The scatter plot, histogram, and Q-Q plot showed that the assumptions of homoscedasticity, linearity, and normality of the data were met. The VIF values ranged from 1.01 to 1.16, indicating that the equation was reasonable because the VIF was less then 10. The tolerance values were quite large, ranging from .87 to .99. Based on above, multicollinearity was not a problem.

Table 10 lists the results of the analysis. In Model 1, all background characteristics variables accounted for only 5.0% of the variance of the albumin levels (R^2 = .08, R^2_{adj} = .05, F [5, 150] = 2.64, p < .05). The regression coefficients of age and health problems and medications were significant at the .05 level (t = -2.44, p = .02; t = 2.28, p = .02, respectively). In Model 2, the variables of nutrition self-efficacy, IHLC, PHLC and CHLC in the second set of predictors explained 6.0% of the variance of albumin levels; however, none of these predictors' regression coefficients had a p value less than .05. The R^2 increased from Model 1 to Model 2 by .04 (F [4, 146] = 1.57, p > .05). In the final model, the only significant predictor was health problems and medications.

Table 10

Hierarchical Regression to predict the Albumin Levels in Taiwanese Elderly (N=156)

	Model 1 [a]				Model 2 [b]			
	B	β	t	p	B	β	t	p
Age	-.01	-.19	-2.44	.02	-.01	-.15	-1.88	.06
Gender (0 = Male; 1 = Female)	.07	.13	1.56	.12	.05	.10	1.13	.26
Educational level	.00	.04	.41	.68	-.00	-.01	-.15	.88
Living arrangements	-.00	-.00	-.02	.98	.00	.01	.12	.91
Health problems and medications	.03	.18	2.28	.02	.03	.19	2.32	.02
	R^2 = .08 R^2_{adj} = .05 F = 2.64, p =.02							
Nutrition self-efficacy					.00	.11	1.20	.23
IHLC					.01	.10	1.07	.29
CHLC					.00	.05	.58	.57
PHLC					-.01	-.10	-1.31	.19
					R^2= .12 R^2_{adj} =.06 F = 2.218, p = .03 R^2 change = .04 F change = 1.57, p = .19			

Note. Dependent Variable: the albumin levels. [a] Predictors: age, gender, educational level, living arrangements, health problems and medications. [b] Predictors: age, gender, educational level, living arrangements, health problems and medications, nutrition self-efficacy, IHLC, PHLC, CHLC

Analysis of Qualitative Data

Whereas well-established instruments are able to quantify such variables as nutrition self-efficacy, HLC, and nutritional status, those numbers fail to capture the individual eating patterns of persons living on their own in the community. Personal narratives tap into a rich dimension of phenomena not captured by researcher-selected questionnaires. For that reason, a qualitative content analysis (Waltz et al., 2005) was used to explore the eating patterns among the elderly to answer the remaining research question.

First, notes taken during the interviews were translated into English by the researcher. In addition, the transcribed interview texts were read in their entirety and then re-read line by line several times for accuracy. Second, lines of text relating to the eating patterns of participants were identified, and descriptive labels were written tentatively in the margins. Third, text under given labels were grouped together under appropriate categories, and each category was divided into subcategories. The transcripts were re-read and labeled until all major categories and subcategories were identified.

Of the 156 participants in the study, 58 individuals (37.18%) answered the open-ended question which asked, Is there anything else you would like to tell me about your eating patterns? Most participants responded only briefly, but a number of the participants expressed themselves extensively. The qualitative analysis identified three major categories within the narrative contents of the 58 participants: *eating and old age, eating and faith*, and *eating and family harmony,* along with subcategories in each. Both the categories and subcategories are described in the following sections as they relate to the eating patterns of the elderly.

Eating and Old Age

The most information identified by the participants was eating and their old age. The participants emphasized that their eating patterns related to the fact that they were getting older. Of the participants providing comments (n = 58), 32 participants (55.17%) said that the most important aspect of their eating patterns was being in their old age. For a closer look into this research area, the category was divided into three subcategories: *achieving good health, adjusting to health problems*, and *upholding old customs*.

Achieving good health. The first subcategory, achieving good health, pertained to the participants' desire to eat healthy foods to stay healthy in their later lives. Although the aging process had affected the nutrition of many of the elderly, 19 participants (32.76%) commented that they were aware of the importance of healthy-eating practices in regard to healthy living in the future. Most of the participants who commented (n = 12, 20.69%) stated that, as people age, healthy eating becomes increasingly important for healthy and independent living. For example, one woman stated, "I am very conscious of my health and the need to eat properly so that I will be in a healthy condition when I get older." Another woman said, "I eat better now because I am old. I've decreased the amount of food that I usually eat, and I pay much closer attention to preparing healthy foods for myself." One elderly man said,

> I am very conscious of my health. Look how healthy I am! In my opinion, being an older person probably helps me keep my general health because it helps me keep things in perspective. For example, I've decreased the amount of my meals, adopted a lower-fat diet, and therefore reduced the amounts of unhealthy foods.

Such comments supported the validity of this subcategory.

For six informants, one reason for achieving good health was to decrease the burden on their children. One woman was very candid on this point: “I am really taking care of my health because I live alone. If I stay healthy, the burden and stress on my children will be decreased.” Another woman made the same point: “I plant vegetables and eat them; therefore, I can eat healthy food to stay healthy. For this reason, I don’t need to depend on my family.” Similarly, an elderly widow remarked, “I am directly responsible for my health. In that way, I don’t need to depend on my children, and I can reduce the burden on them.”

One participant had an interesting reason for healthy eating. She stated that she forced herself to eat healthy foods to keep up her appearance, as opposed to achieving a healthy life. Her story was as follows:

> I take very good care of my appearance. To that end, I eat vegetables and fruits a lot, and I cut out fat and skin from my meals. I say “no” to any high-calorie food. I do this not out of concern for my health, but to preserve my appearance. If I feel I’m good looking, then I feel good, happy, and confident. To me, keeping myself good looking is more important than anything else.

For achieving good health, the elderly participants identified a number of behaviors they engaged in to ensure their good nutrition. Primarily, they decreased the amount they ate during their meals. Although the participants mentioned that, as they were growing up, they were expected to eat everything on their plates, seven participants said that the secret to elderly nutritional health was to eat smaller portions during meals. For example, one man said, “I do not eat anything in excess.” A woman said, “For my health, I don’t like to eat too much.”

A second behavior mentioned by the participants was to eliminate meat and increase vegetables. Five participants were alike in commenting that meat was not good for elderly persons and that eating vegetables would help them stay healthy. For example, one man said, “After I retired, I planted a lot of vegetables in my backyard, because they are all good for me, you know, an old person.” Moreover, one elderly man explained how to eat healthy whenever and wherever people are as they get older:

> I have the skill to eat healthy even when I eat outside. Like, I don't eat too much, or I tell the waiter not to put too much salt, sugar, or other powder in my meal. If the food is too salty, I will ask the waiter to give me a cup of water, and then I will add the water to my meal to decrease the amount of salt. Or, I will leave the soup alone if the soup is too salty or too oily. When I go to enjoy the Chinese New Year with my children and grandchildren, I don't change my eating habits a lot. For example, I eat a small meal, and I choose bland foods to eat.

Adjusting to health problems. A second subcategory supporting the “eating and old age” category was “adjusting to health problems.” The elderly tried to eat foods that were suited to their age and health problems. Health problems, which were often mentioned in conjunction with the aging process, were the most commonly discussed nutritional topic in the narratives of 10 subjects (17.24%). Statements in the text revealed that, although the lack of any health problems helped one to choose and eat healthful foods, many participants had to alter their diets because of health problems such as dental problems, diabetes, and hypertension.

Dental problems, which were cited by 7 persons (12.07%), limited some participants in their ability to eat fresh fruits and vegetables. Nevertheless, they

developed strategies to enjoy such foods despite their dental problems. For instance, one 72-year-old man said the following:

> For eating, my teeth problems usually force me to give up a lot of foods that I like to eat, for example, fruits and vegetables. All of my teeth are dentures. Therefore, all I can eat are soft foods. But, you know, to live to old age is a blessing. I enjoy my soft foods, and I try to make them delicious.

Another participant with teeth problems described his strategy for making eating easier.

> Although my teeth are getting worse and worse in my old age, I always try to find something new that my teeth can handle. Recently, I found a wonderful glue for my temporary dentures, and that helped me a lot. I feel like I have new teeth and I can eat whatever I want to eat. Ha…!

Another health problem related to eating patterns was diabetes, which affected four participants. One male said the following:

> When I found out I had diabetes, I felt very sad, because I knew it would cut out a lot of my favorite foods. But after I tried my new diet recipe, I felt better, because they all healthy foods that were easy to prepare. Therefore, I said to myself, "Don't think about it too much. Just try to stay within the limits of your health problem. You use your body for a long time, and then, of course, something goes wrong." So, we need to do what it takes to make ourselves better."

Moreover, a hypertensive elderly woman said, "Because I have hypertension, I try to eat healthy by, for example, cutting out meats, decreasing my salt intake…."

Not all participants, however, approached their health problems in positive ways. One widower, for example, said, "I know that eating fat and skin is not good for my

health, but, in regard to my teeth problem, I feel fat and skin are all right for me." Another elderly man made to a similar comment, saying that, although he had hypertension, he did not try to control his diet for high blood pressure. Instead, he used a method he had developed himself:

> I don't believe in doctors or other people, and I don't like to control my diet. Since I have high blood pressure, I try strategies that my ancestors developed, like cooking with tree mushroom and ginger and drinking it every day. It is amazing, and it makes my blood pressure better.

Upholding old customs. The third subcategory, upholding old customs, emerged from the narratives of the participants. Participants said that their eating habits and customs were valuable to them. Several participants' comment revealed that their eating patterns had not changed as they aged, and they preferred to eat the way their generation had eaten (n = 9, 15.52%). For example, one man described that the eating habits of his generation were quite different from those of later generations:

> In our generation, we went through a very difficult era as we grew up. We were very frugal persons, and we tried to eat everything that we could manage to find. For that reason, all foods were natural instead of ready-made. Based on that, I feel proud of my generation's eating patterns.

Moreover, two participants emphasized the benefits of the traditional Chinese way of eating by comparing the foods and health of the old and new generations. The following are typical comments: "In my generation, we never ate foods like those of the new generation, and we could keep our health and shape easily. That is because we ate rice and natural foods." Another participant said, "We see in the news everyday that

people have found something wrong with some new type of food, but they never find anything bad in traditional foods."

The following excerpts indicate how eating customs and preferences for traditional foods influenced the everyday food intake of the participants. One elderly man described his feelings this way: "A lot of foods we used to eat in our generation that I still eat. In my generation, we keep with the Chinese eating tradition, that is, our parents' tradition, the way they cooked and served us food." Furthermore, one man stated that "I like to eat traditional food. For example, I eat rice everyday. If I don't eat rice, I feel my stomach is empty, and I feel very unsatisfied." Finally, one participant suggested that eating traditionally was healthy:

> My belief is that, if I can eat and feel satisfied, that is good for me. That is our traditional way of eating. If we are talking about healthy eating, then let's consider that our ancestors ancients just ate what they could eat, and they stayed in good health. Therefore, I follow my ancestors' way of eating; namely, I just eat what I can eat according to old custom.

One important Chinese tradition is to avoid overindulgence in food or drink, which is considered a sin. For instance, the ideal amount for every meal is "hci fen pao (七分飽)," which translates to "70% full is enough" (Newman, 1985). One participant made that point by saying, "I always follow our important rule for eating, called 'hci fen pao.' To do this, I always have a small bowl for my meal, and I never feel I am full."

In addition to practicing "70% full is enough," another group of respondents indicated that they were still following the Chinese cultural eating practice of "balancing Yin (cold) and Yang (hot)." For example, three subjects indicated how important it was

for them to balance Yin and Yang in their lives. One male said, “When people enter into their old age, they need to take care to balance ‘hot’ and ‘cold’ foods to promote their health. For example, too much hot or too much cold is not good for elderly persons since their blood is turning weak.” In addition, a woman said, “The old Chinese saying regarding ‘yin-yang’ is a good example. You cannot eat something too much, or you will get sick. So we cannot eat too much or too little, too salty or too bland, too hot or too cold.” One widow provided an example of hot foods: “For example, peanuts belong to hot foods; therefore, they are not good for the elderly.”

Finally, according to the responses, it is difficult to change old eating habits. On the other hand, the eating habits guide the participants as they go through the day. For example, one 77-year-old man stated his experience as follows: “I want to keep my eating habits; for example, I believe that we need to eat some meat everyday so that we can have energy for our bodies.”

Eating and Faith

The second category identified from the respondents’ replies was *eating and faith*. This category included indications that eating patterns were influence by nature and not the participants themselves or anyone else. Twenty-five participants (43.1%) stated that the way they ate was related to their faith, that is, depend on God or fate and on one’s desire to enjoy life. Those subcategories are described in the following paragraphs.

Depending on the God/fate. The first subcategory was “depending on the God/fate,” which was identified from the responses of some participants. In this subcategory, the participants described how God and fate influencing their eating patterns. Eleven elderly persons (18.97%) said that they did not care about eating healthy

because health was decided by God and depended on fate, not themselves. Interestingly, more females than males made reference to this point (males = 3, females = 8).

Five participants stated that God and fate control everything, because they determined what life we will have and how long we will live before we born. The claim of those participants was that "everything is set up already before we born. Hence, our life depends entirely on fate, and you cannot control your fate. Only God can control fate." Consequently, people have no choice in regard to staying healthy or not, regardless of one's diet. One 86-year-old woman made this argument as follows:

> I feel that food is not related to our health, because health is related to fate and God. I look around the community, and I see some people who don't care about how they eat and they stay healthy. On the other hand, I see people who strictly control their diet and try to stay healthy, but they are always sick. So, how do you explain it? It's because of God.

Another woman echoed this point by describing how God and fate were related to her eating behavior:

> Regarding health, I feel it depends on God and fate. Even when I take care of myself, if I am going to get sick, I will get sick, especially when I get older. For instance, I have a friend who doesn't care about health and tries to eat all she can eat, but she is one of the people in our village with great longevity. Therefore, it doesn't matter what I eat. Health depends on fate. God will decide how long I will live, not me.

Those who believed that God and fate were in control adopted strategies to achieve peace rather than to stay healthy. One male participant was candid in his

explanation about how God figured into his life and health: “I believe that health is related to God, who to me is Buddha. If I feel something is wrong, I go to the temple and pray. Then I feel better.” One widow provided a similar explanation:

> To me, if I feel uncomfortable, I believe I have offended God. After I worship with God, I have something objective that will protect me and let me feel peace, and then I feel better. Therefore, I feel that, if I become ill, it means my luck is bad at that time. Meanwhile, I tell myself that I need to be very careful or I will have something go wrong in my life.

Among those participants who believed that God guided their lives and decided how healthy they were, some expressed or implied pessimism in regard to their way of eating. One female participant stated that Buddha influenced her entire way of life rather than just healthy eating:

> Buddha is an important factor in my health. I am in my seventies, and I don’t care about how to eat healthy. I worship with Buddha everyday, and then Buddha helps me deal with every difficult thing in my life. Therefore, I don’t believe in anything but Buddha.

Likewise, one diabetic participant said,

> When I found out that I had diabetes, I tried to control my food intake, but it was too difficult to me, and the outcomes were not good. Therefore, I gave up trying to control my diet in regard to my diabetes, and I ate everything I liked to eat. You know what? My diabetes status has not changed. I think it is because I depend on my Buddha, who helps me stay healthy.

Enjoying later life. The second subcategory of responses within the eating and faith category was enjoying later life. Some informants said that, as they grew older, they no longer cared about healthy eating, and they just wanted to enjoy their later lives. Fourteen elderly participants (24.14%) stated that their getting older had placed no food restrictions on them whatever; that is, they ate anything they wanted to eat whenever they wanted to eat it. Furthermore, some participants believed that, in their old age, food was anything eaten to make them feel good and satisfied.

For example, one respondent said, "I feel that, when we get old, we don't need to care too much about how to eat. Just enjoy the food you like because life is coming to an end." Another comment was "We need to enjoy our life, because we no longer have much life to live. Therefore, I always tell myself just to eat and enjoy the food, because tomorrow you may not be able to eat it." Similarly, "If I can eat delicious and tasty food, it is a blessing to me. Don't think about 'healthy' or 'unhealthy.' We need to enjoy the food. It is part of life." Finally, "For me, because I am in my eighth decade of life, I would like to enjoy my life instead of suffering food deprivation." Those comments were typical of this subcategory.

Other participants said that they had a casual approach to eating. They argued that too much emphasis on eating was a waste of time and energy for older persons. Four participants said they were easily satisfied now that they were older. One man concurred with this point: "I don't care about how to eat. I feel it is too much a bother for me. My belief is, if I can eat and feel satisfied, that is good enough for me, because I'm old." Another elderly man indicated that casual eating saved him energy:

> When we get old, it is important that things come easy. Regarding eating, if I have an appetite, then I eat, no matter how healthy or unhealthy the food. That is the easy way to eat for me, because I don't have to think about how to choose the right food and how to cook it. To tell the truth, for me it is foolish behavior to concern myself with "healthy food" when I am in my old age. It wastes my time and energy.

Furthermore, two women had a similar explained:

> It is a lot of bother to eat right. I cooked for my children and husbands for years and years. Now I got old and I sometimes lack interesting and motivation to prepare healthy foods for myself. A lot of time because you are getting older and you don't feel like it. I mean, I just want to enjoy my later life instead of working hard.

Eating and Family Harmony.

When the participants explained how their eating patterns were influenced by their families, the comments were labeled as *eating and family harmony.* This category pertains to comments about how important it was to eat food with the older person's family. Twenty-three subjects (39.66%) had comments on this topic, which included two subcategories: *following the family eating rules* and *self-sacrificing for the family*.

Following the family eating rules. The notion of following the family eating rules was central in this category. Fourteen participants (24.14%) said that they tried to accept and follow their families' eating rules and to please their families. For example, one woman said, "I live with my son and my daughter-in-law. All meals are prepared by my daughter-in-law. Therefore, I always eat what she prepares for me and never complain."

Similarly, one man said, “My belief is that, when we are getting older, we just accept whatever food is prepared by our families. Don’t have too many opinions about the food. For me, therefore, I don’t need to learn what healthy eating is.” In sum, most of these participants agreed with the statement “I try to eat and like the foods that my family likes.”

Several subjects indicated that following the family eating rules had advantages. Family members who valued being creative with food would attempt to prepare healthy foods that the entire family could enjoy. One woman discussed this practice:

> Actually, all of my favorite foods are unhealthy, like sweet foods and meat. Yeah, I had to start cooking right because my husband has diabetes. I gave up my favorite foods, ate smaller amounts during meals, and prepared foods appropriate for him. That was good for me, because now I am a healthy eater.

Still another respondent said,

> I always eat what I like to eat, and I don’t care about how healthy or unhealthy the food is. However, I try to control my diet because my wife has diabetes. When we eat together, I need to be concerned about her health; therefore, I eat a lot of vegetables and eat small amounts during meals everyday.

Some participants described problems they had in conforming to the eating habits of other family members. Because they had to eat what was available to them at home, they often had to do without their favorite foods. For instance, one woman responded as follows:

> Sometimes, I would like to eat something soft because of my teeth problems. You know what, my daughter-in-law prepares food for me, and she is a vegetarian. Therefore, I have to eat all vegetables, and sometimes I cannot bite into it.

Another woman stated that, in her case, following the family eating rules would lead to unhealthy eating patterns: "We can easily avail ourselves of healthy foods if only my husband and I are eating together. If we eat with our whole family, however, it is impossible to stay on a healthy diet. All the foods are unhealthy." This statement suggested that the participant had negative feelings about eating with her family because, as she said, "sometimes you have no choice in what you eat."

As the participants indicated in their responses, following the family eating rules was a major factor in the individual's eating patterns for several reasons. The most important reason was to maintain a good relationship with the family. For example, one participant said, "I don't like the types of food my daughter-in-law cooks, but I try to accept it. That is because, in our Chinese culture, nothing is more important then having peaceful relationships among family members." Similarly, another participant said, "I don't like the food my daughter-in-law prepares, but I eat it and never fight with her. I try my best to have a good relationship with my family."

Dependence on the family is another factor that may be related to following the family eating rules. One elderly man, for example, said, "When we get older, we always have to depend on our families. I better get used to it, because now I am old, and I need a lot of care from my family." A participant who was a widow also addressed this point:

> I never express an opinion about the food when I eat with my family. I try to eat whatever food they prepared. That is because I want to be perceived by my family

as a sort of kind senior member, so that then they would take care of me continually. You know, I am old.

For the reasons above, although eating according to family rules had some adverse effects on eating patterns, the participants nevertheless tried to observe the family rules to preserve family harmony.

Self-sacrificing for the family. "Self-sacrificing for the family" was the second subcategory related to family harmony. The participants often gave last priority to their own nutritional needs and desires and gave first priority to the needs of other members of the family. Elderly woman, for example, tended to their children's and husbands' needs before they took the time to care for their own nutritional needs. Participants mentioned that, even though they were getting older, they still catered to the preferences of other family members rather than strived to meet their own needs. Nine participants (15.52%) indicated in their responses that they would forgo eating their favorite foods if necessary to meet the food preferences of other family members. Interestingly, all nine of those participants were females.

Thus, elderly women were more likely to sacrifice their needs for the needs of their families. One response in this subcategory, for instance, was that "my children' food and health are a priority. What I cook everyday is for my family." Two other comments typifying those in this subcategory were made by two women. One said, "I put my favorite foods aside for the needs of my family. That means I eat when and what they want." The other woman said, "I always eat the easy way if I eat alone, like go out and buy a small amount of fast food. But if my son eats with me at home, I will cook a lot and prepare the food that my son likes."

This tendency to sacrifice one's self for the sake of others may influence the nutritional status of the elderly person. For example, one woman said that, "being a mother, I always care about my children and my grandchildren. I don't care what I eat if I eat alone at home. I think, as we get older, we don't need to care about what we eat. We just need to feel full."

Two women stated the reason they always tried to prepare foods their families preferred. The first woman, a widow, said, "I prepare food for my family. I try to cook food that is good for my family, not for myself. I don't think about myself because, to me, family is more important then myself." The other woman whose response was representative of this subcategory was the following: "Taking care of my family often makes me feel good. That is because I feel, even as I get old, that I have the ability to do something good for my family." Those comments support the inclusion of *self-sacrificing for the family* as a subcategory of harmony within the family.

Summary of the Findings

The findings of both the quantitative and qualitative aspects of the study have been presented. The quantitative results, which were based on a significance level of .05, revealed several significant relationships among background characteristics, nutrition self-efficacy, HLC, and nutritional status in the sample of Taiwanese elderly persons.

First, the data indicated that persons of advancing age tended to report lower nutrition self-efficacy and had lower scores on the MNA scale and albumin levels. Females tended to be more chance oriented in their HLC. A higher educational level was related to better nutrition self-efficacy and better MNA scores. Surprisingly, as the number of health problems and medications increase, so did the MNA scores, but not the

albumin levels. Living arrangements did not relate to nutrition self-efficacy, HLC, and nutritional status. In further regard to relationships among nutrition self-efficacy, HLC, and nutritional status, the results showed that the level of nutrition self-efficacy was significantly and positively correlated with the MNA score and albumin levels. The level of nutrition self-efficacy was also positively and significantly correlated with IHLC and negatively and significantly correlated with CHLC. Moreover, greater internal orientation was related to better MNA scores. Finally, a hierarchical multiple regression was performed and the results showed that age, educational level, health problems and medications, and CHLC all had effects on the MNA scores, and only health problems and medications explained significant variances on albumin levels.

The qualitative findings identified eating patterns among the elderly participants related to three categories: *eating and old age, eating and faith,* and *eating and family harmony*. Regarding *eating and old age*, the participants reported that they tried to achieve good health by healthy-eating practices, to eat as their health problems required, and to eat in accordance old customs. The second category identified from the responses was *eating and faith*. Elderly persons who responded in this category tended to depend on God and fate to guide them in their eating. Because they believed that everything depended on nature, they felt that there was nothing else to do but enjoy their later years. The last category identified was *eating and family harmony*. Some participants placed priority on maintaining family harmony by following family eating rules and by sacrificing their own wants to meet the wants of other family members.

CHAPTER 5

DISCUSSION, IMPLICATION, AND RECOMMENDATIONS

This chapter discusses the study findings, evaluates the theoretical framework, assesses the strengths and limitations of the study, and presents implications of the findings. Finally, the chapter makes recommendations for future nursing practice, research, and education.

Instruments

Most instruments used in the study had an acceptable reliability (Cronbach's alpha ranged from .76 to .93), with the exception of the Mini-Nutritional Assessment (MNA) scale (Cronbach's alpha was .65). The reliability of the MNA scale was also not high in other studies. For example, in a study conducted by the developers of the MNA, Guigoz et al. (1996), the Kappa coefficients for inter-rater reliability ranged from .42 to .65. Although still significant, the inter-rater agreement was low. Reasons for the low internal consistency regarding the MNA scale, and discussions of other measurement issues are given in the following paragraphs.

Most items in the MNA scale are categorical, and therefore the ratings allow only low variance among the items. Not surprisingly, therefore, a low internal consistency was found. Furthermore, the value of Cronbach's alpha depends on correlations among items (Streiner & Norman, 1995). Some items in the MNA scale, however, may not be correlated with each other, because the sample in this study was primarily healthy. Healthy people can be expected to have limited scores on the scale, so that a ceiling effect

on most item scores will keep the variability among the items low. For example, the item-to-total correlation for the item "How many full meals does the patient eat daily?" was -.08 (see Appendix F). According to the responses of the participants, 154 subjects had three meals a day, with only two participants consuming two meals a day, and yet their MNA score was still high (25 and 28.5, with a possible range from 0 to 30). Since the participants in this study were healthy, it is understandable that they had no problems in such as areas as mobility, mode of feeding, living independently, and pressure sores or skin ulcers, and their scores were all relatively high. On the other hand, a weakness of the MNA is that a number of questions target frail elderly persons, but not elders who live independently.

The MNA has become a good tool for measuring nutritional status in the elderly, but it entails certain methodological difficulties in an international study, that is, one across different cultures. First, the questionnaire was not designed specifically for the Chinese population. Most dietary-intake items assessed in the MNA scale are consumed in greater quantities in Western countries, and those may not culturally fit to the Taiwanese elderly, for example, cheese and yogurt are items that the Taiwanese elderly rarely consume (item K, see Appendix G). Therefore, further study should be conducted to adjust the MNA to be more culturally specific. Second, Item D in the MNA addresses the presence of acute disease or psychological stress. Such conditions are difficult to rate, because every individual defines psychological stress differently. For example, diagnosing a chronic disease, retiring, or losing a spouse may or may not be considered psychological stressors.

For the reasons presented above, although the MNA tool was initially validated for relatively healthy elderly (Guigoz et al., 1996), its use in respect to health status and cultural differences requires additional studies and refinement for use in the community-dwelling elderly population in Taiwan. It is also recommended that a new tool be developed for measuring nutritional status in Taiwanese elderly.

Another instrument used in the study is the Cardiac Diet Self-Efficacy scale (CDSE). Although the reliability alpha for this tool was adequate (alpha = .88), some items presented problems when administered to the community-dwelling elderly living in Taiwan. For example, the Taiwanese elderly in Yilan County live an agricultural lifestyle in which they eat regular meals with plenty of fiber and vegetables, and snacks between meals and eating out were not common. For this sample, therefore, scores on items such as "Increasing the amount of fiber and vegetable in my diet," "Cutting out unhealthy snacks during the day or evening," and "Staying on a healthy diet when I eat at a restaurant" encountered ceiling effects. Consequently, low variances for those items were found. Furthermore, the qualitative findings revealed that the family influenced elderly eating patterns; however, no item on the CDSE scale was related to the self-efficacy and eating with family (see Appendix G). Therefore, revisions to the CDSE scale are required if it is to be administered to the Taiwanese elderly living in rural areas.

Sample Considerations

Age

The average participant in this study was 72.29 (*SD* = 5.22) years of age, with most participants between 65 and 74 years old (*n* = 108, 69.3%). Although the mean age of the sample is similar to that in the Leung, Hsu, Chen, and Chen (2002) study (where

the mean age was 72.2 ± 4.7), this sample was younger than those in other studies that recruited from communities. For example, in the Chen, Chang, Chyun, and McCorkle (2005) study, 40 percent of the participants from the community were aged 85 years or older, with 20.0 percent in their 90s. The reason for the younger sample in this study may be related to the exclusion of unhealthy elderly persons from participation, and health status is associated with age (Callen & Wells, 2003; Wang, 1999). Furthermore, the older elderly may receive care for their health issues in clinic settings or from hospital resources instead of public health centers. As a result, the participants in this study were relatively young compared to those in similar studies.

Gender

The life expectancy of women is longer than that of men (74.7 years for males, and 80.5 years for females; U.S. Census Bureau, 2006); hence, most studies of the elderly recruited more females than males from communities. The percentage of females in studies reported in the literature ranged from 59.3% to 74% (Chen, 1999; Greene et al., 2004; Heather, Keller, Margaret, & Hedley, 2002; Jenkins Reid, 1999). It is noteworthy, therefore, that the proportion of male participants in the current study was 60.9% (n = 95), which reflected the proportional gender differences in this age group. In this regard, the current sample was similar to samples in other studies that were recruited from populations in the West and Taiwan. For example, in Crotty et al. (2002) the randomly selected, community-living sample comprised 55.3% men and 44.7% women. Likewise, Leung et al. (2002) had more male than female participants (59.49% vs. 40.51%). Nevertheless, most samples in previous studies consistently reflected gender proportions

in the population, whereas samples with primarily males were unusual. Three reasons may provide some explanation.

First, women have more health problems than men (Chen & Wang, 2005), like poor vision, joint pain, hypertension, and diabetes, and they have poorer nutritional outcomes as compared to the elderly male subjects (Chan et al., 2002; Chen, 2002; Keller & Hedley, 2002; Marshall et al., 2001). Hence, more female elderly may have been excluded from this study because of their health problems, or again because they received care for their health issues at clinic settings or hospitals instead of public health centers. A closer look at the drop-out reasons in this study showed that two elderly, both females, gave reasons that they were "incapable of ambulating" and felt "sickness and have doctor's appointment" (see Table 3). Those reasons seemed reasonable because, as Leung et al. (2002) showed for an elderly population, males' intentions to participate for the health evaluation were higher than those for females (63.4% vs. 36.7%).

Second, because one exclusion criteria for this study was obesity as determined by the BMI, 40 potential participants were excluded. Research conducted by the Department of Health in Taiwan (2004) showed that the prevalence of obesity among elderly females is higher than among males. In the current study, of the participants dropping out because of obesity, 26 out of 40 were female. The higher exclusion rate of females may also relate to the proportional differences in gender for this age group.

Finally, for Chinese women, a reason for the lower participation in this study than for men may be related to their different social economic backgrounds and health-control beliefs. Lower educational levels (t [154] = 4.67, $p < .01$ [two-tailed]) and higher CHLC orientation (t [154] = -2.11, $p < .05$ [two-tailed]) compared to those for males may

indicate that females in Taiwan are more passive in taking annual health examinations. Furthermore, the qualitative results revealed that females, more than males, considered their family health needs before their own; for example, remarks under the subcategory *self-sacrificing for the family* came from nine subjects, all female. One woman gave the following reason for dropping out of this study: "I need to go back home and prepare food for my family; I cannot wait for your data collection." It became obvious that lower educational level, more chance orientation, and more self-sacrifice for the family may have influenced female participation in this study.

Gender differences regarding health concerns are complicated. Tsai (1995) suggested that health attitudes and behaviors appear to be associated with the sex-roles shaped by society and culture. It is important, however, that further research explore the gender differences regarding nutritional health.

Educational Level

Overall, the educational level was low for this sample compared to that for samples in other studies. The mean educational level by years was only 3.96, and almost half of the participants were illiterate (48.7%). According to reviews of studies involving community-dwelling elderly, 80% of participants had high school educations (Ledikwe, Smiciklas-Wright, Mitchell, Miller, & Jensen, 2004) or a mean education of 13.5 years of schooling (Callen & Wells, 2005).

Historical contingencies may play an important factor in the educational level of this sample. The current generation of the elderly in Taiwan had to face the chaos of war, and many became destitute and homeless (Lu, 1998). Moreover, during their schooling years, Taiwan was governed by Japan, and life for this generation was hard, and many of

these elderly people recall the psychological terror of the Japanese occupation. Those stories were coupled with memories of tragedy and loss of fortune. Two elderly recalled conditions such as the following: "When Japan governed Taiwan, we had only a little rice every day, which was not enough to fill our stomachs. We were all starving. It was the toughest time in my life. Nothing can compare with that hardship;" and it was "too difficult to survive for us when we were still young. Nobody had enough energy to think about education." As Acton and Malathum (2000) suggested, only people who have had their physical needs satisfied can partake of other opportunities; otherwise, it is difficult to become motivated toward achievements such as education.

Nutritional Status

For almost all of the participants, albumin levels were normal (99.4%), and the average MNA scores were high (M = 25.79, SD = 2.79, range = 17.5 to 30). According to the MNA scores, no subjects in the sample population were considered malnourished, 17.9% (n = 28) participants were found to be at risk of malnutrition (borderline), and 82.1% (n = 128) were well-nourished.

Although those results were supported by a literature review showing that malnutrition among the community-dwelling elderly ranged from 1% to 7% (Guigoz et al., 1996), most research results showed that the nutritional status of the elderly was inadequate. For example, 24% to 60% of community-dwelling elderly persons had nutritional problems according to studies of Western and Taiwanese populations (Keller & Hedley, 2002; Lee, 2002; Marshall et al., 2001; Sharkey & Schoenberg, 2002). In a study using the same MNA scale, Hsu (2003) found that 24.5% of community-dwelling

Taiwanese elderly could be classified as at risk of malnutrition and that 2% could be classified as malnourished.

Again, those differences may relate to sample characteristics. In general, the elderly in the current study were relatively healthy, and none were experiencing malnutrition. In fact, because health problems are highly related with nutritional status (Sharkey et al., 2002; Tsai et al., 2004), elderly persons who were hospitalized or who suffered diseases affecting their nutritional intake were excluded from the study. Moreover, whereas the Wang (1999) study showed that the main barrier to nutrition may be a lack of money to buy proper foods, the current study found that all the participants had sufficient income to meet their needs (100%); therefore, the adequate income status for this sample may also be a factor contributing to relatively good nutritional outcomes.

The Relationships among Selected Background Characteristics, Nutrition Self-Efficacy, HLC, and Nutritional Status

Although the effect sizes of the associations among the various factors were small, the data analysis revealed several significant relationships among the relationships of background characteristics, nutrition self-efficacy, health locus of control (HLC), and nutritional status in the Taiwanese elderly.

Age

Negative correlations were found between age and nutrition self-efficacy (r = -.24, p < .01), age and nutritional status according to the MNA score (r = -.32, p < .01), and age and albumin levels (r = -.19, p < .05). According to Bandura's self-efficacy theory (Bandura, 1986), elderly people tend to observe other elderly persons who they set up as models. When the models evince negative behaviors, those behaviors may become

negative reinforcement for similar behaviors in the other elderly. Moreover, chronic disease and the loss of independence among the elderly may affect mastery levels and lead to lower self-efficacy. As McDougall (2004) pointed out, one's experiences and the interpretation of those experiences, if they are negative, can serve to lower efficacy. Therefore, observational experiences and poor health condition may place older populations at risk for reduced self-efficacy. It is reasonable, therefore, to expect that lower nutrition self-efficacy relates to poorer nutritional outcomes (Conn, 1997; Greene et al., 2004; Liou & Contento, 2001; Matheson et al., 1991).

Surprisingly, the results of this study showed that age was not related to HLC. Kist-Kline and Lipnickey (1989) argued that the elderly hold more external beliefs, and some experts have commented that Chinese persons tend toward externality (Chae, 1987; Chen, 2001; Guo, 1995). To determine whether aging follows the pattern of increasing internal or external orientation, the current study conducted a *t*-test on this sample to explore the differences between the old and very old participants in their control beliefs. The results showed that even the very old (over 80) did not follow the pattern of increasing external orientation with increasing age (t [154] = 1.37, $p > .05$ for IHLC, t [154] = .76, $p > .05$ for CHLC, t [154] = -.43, $P > .05$ for PHLC). That result supports the statement by Morganti, Nehrke, Hulicka, and Cataldo (1988) that the very old do not change their HLC orientations and confirms the contention of Lachman (1986) that there may be increasing stability in control-belief orientation with age.

One cautionary aspect of the current study is that its sample was primarily healthy; unhealthy elderly or those aged 88 years or more were excluded from the research. As Abu-Bader et al. (2002) and Goldsteen et al. (1995) suggested, declining

health may produce increasing orientation toward externality. The relatively healthy sample in this study, therefore, may show no differences in age-related HLC.

Gender

Most variables showed no significant relationships with gender, with the exception of CHLC ($r = .17$, $p < .05$). The scores for CHLC indicated that elderly females tended to be more chance oriented in their control beliefs. Moreover, in a *t*-test to examine the difference between males and females, the CHLC scores were significantly higher for females than for males (t [154] = -2.11, $p < .05$ [two-tailed]). This finding was compatible with the qualitative result that more females than males emphasized that their eating patterns depended on God and fate (males = 3, females = 8).

There is a possible explanation for this result. As Speake et al. (1989) suggested, higher education levels are associated with higher IHLC scores, and participants with less education have higher CHLC and PHLC scores. These results support a similar point made by Kist-Kline and Lipnickey (1989) and Wallston et al. (1976), namely, that education is a significant factor in distinguishing internality and externality. To clarify, a *t*-test was used to exam the gender difference in educational levels. The results showed that the educational levels for males and females were significantly different (t [154] = 4.67, $p < .01$ [two-tailed]), with males having an average of 5.12 years of education and females having only 2.16 years. Consequently, the lower educational level of females in this sample may contribute to their greater likelihood of being chance oriented.

Educational Level

Result of this study revealed that the more years of education the elderly have, the higher the nutrition self-efficacy they held, and the better MNA scores they achieved. The

findings in the current study were not unique. Data from previous studies showed that higher educational levels were related to greater self-efficacy (Leganger & Kraft, 2003), and better nutrition (Chan et al., 2002; Speake et al., 1989). It is understandable that people with higher educational levels gather more nutritional knowledge, feel more confidence in the foods they consume, hold more positive nutritional attitudes, have better eating behaviors, and experience better nutritional outcomes (Elbon et al., 2000; Lee et al., 1997; Lin & Lee, 2005; Pullen et al., 2001; Wang, 1999).

Living arrangements

Most evidence supported the view that the family was an important factor in the nutritional status of elderly Taiwanese (Chan, 2000; Hsu et al., 2003; Lee, 2004; Tsai et al., 2004). The data from the current study, however, failed to support the view that living arrangements was a significant factor ($p > .05$) in nutrition self-efficacy, HLC, and nutritional status as indicated by MNA scores and albumin levels. The results were different from that found by many other authors, who argued that mealtime companionship and social interaction led to improvements in food consumption and nutritional status among the elderly (Grotkowski & Sims, 1978; Rainey et al., 2000; Vellas et al., 2000).

There are possible reasons for the difference between the findings of the current study and those of previous investigations. In the sample of the current study, the number of other people living together ranged from 0 to 18, with a mean of 3.03; only 9 participants lived alone and 11 participants ate alone. The documentation of the data collection process showed that even those elderly who lived or ate alone still received family help for food preparation. Therefore, the family values were centered on the

elderly, and such close family networks provided support for a number of food-related functions, such as shopping assistance and food preparation. Because almost all participants living with their families, as well as those living alone, had received food-preparation assistance from their families, the associations among living arrangements, nutrition self-efficacy, HLC, and nutritional status were difficult to determine. Consequently, the lack of relationships between living arrangements, psychosocial factor, and nutritional status in this Chinese population warrants further study. An indepth analysis of family functions and values regarding the elderly is suggested for future research. Moreover, qualitative results showed that eating with the family was very important for the participants; therefore, a simple measure of the number of people living with the elder may not be the correct variable to measure.

Health Problems and Medications

Significant results showed that number of health problems and medications were negatively related to nutritional status as measured by the MNA scale (r = -.18, p < .05), but positively associated with albumin levels (r = .16, p < .05). That finding partially supported evidence in other studies indicating that poor health conditions were related to inappropriate nutritional status. For example, studies indicated that chronic disease and polypharmacy are important factors related to meal preparation and consumption (Sharkey et al., 2002; Tsai et al., 2004).

Unexpectedly, health problems and medications were significantly positively related to albumin levels in this study; indicating that participants with more chronic diseases and medications use had better albumin levels. This finding is different from other studies. Most of researchers stated that health conditions were related to poorer

albumin levels (Chan, Suzuki, & Yamamoto, 1997; Chandra, Imbach, Moore, Skelton, & Woolcott, 1991; Sonnenblick, Raveh, Gratch, & Yinnon, 2007).

Some possible explanations are as follows. First, as individuals grow older, health problems make them realize the importance of their health. They are thus more motivated to adopt healthy eating behaviors (Callen & Wells, 2003; Wang, 1999). This point is supported and complemented by the categories identified in the written responses of this study that some of elderly adjusted to their health problems by eating appropriate foods. Moreover, since a fall in serum albumin concentration in community-dwelling healthy elderly persons is significantly associated with aging (Gom et al., 2007; Klonoff-Cohen, Barrett-Connor, & Edelstein, 1992), the younger age of the sample in this study may have led to appropriate albumin levels in this sample. Second, Shibata (2001) found that a digestive enzyme drug was helpful for enhancing serum albumin levels. Since gastrointestinal agents represented the greatest percentages of medication use among this sample, medication may have played an important role in the albumin levels. Finally, the health problems and medications of the participants were analyzed by adding current chronic diseases and medications used together. Because people with different types and severity of health problems may have different nutritional status, the number of chronic diseases may not be sensitive enough to associate with albumin levels. It is important, therefore, to analyze both type and severity of chronic disease in further studies.

The current cross-sectional results do not provide direct evidence of the relationships among background characteristics, nutrition self-efficacy, HLC, and nutritional status. Nevertheless, the results highlight the need for longitudinal studies to investigate the multidimensional nutrient-related aspects for this population.

The Relationships among Nutrition Self-Efficacy, HLC, and Nutritional Status

The study provided some noteworthy findings regarding relationships among nutrition self-efficacy, HLC, and nutritional status, although those associations were small to moderate.

First, the level of nutrition self-efficacy was significantly and positively correlated with the nutritional status as indicated by MNA scores ($r = .23$, $p < .01$) and albumin levels ($r = .21$, $p < .01$). That correlation suggested that, as nutrition self-efficacy increased, so did nutritional status. Self-efficacy has been identified as a crucial factor in adopting healthy behaviors (Bandura, 1977a; 1977b). For example, research shows that increases in nutrition self-efficacy relate to better nutritional attitudes (Greene et al., 2004; Matheson et al., 1991), dietary behaviors (Conn, 1997), and nutritional outcomes (AbuSabha & Achterberg, 1997; Baldwin & Falciglia, 1995).

Second, the results indicated that elderly persons with higher nutrition self-efficacy tended to hold internal-oriented control beliefs, whereas participants with lower nutrition self-efficacy were likely to attribute their health conditions to chance. A review of the literature supported the finding that self-efficacy was significantly and positively related to IHLC (Braman & Gomez, 2004; Wu et al., 2004) and that self-efficacy had a significant inverse relationship to the CHLC (Martinelli, 1996).

Third, results regarding HLC and nutritional status varied. The relationship between the scores on the IHLC scale and nutritional status was positive and significant at a level less than .01. In other words, as the degree of internality increased, the practice of healthy eating increased. Nutritional status and CHLC were negatively and significantly related ($p < .01$). As the participants' belief that their health was due to

chance or luck increased, their practice of healthy eating decreased. This result was no surprise, because people who believe they have no control over what happens to them find little impetus to help themselves. No significant relationship was found between PHLC and nutritional status ($p > .05$).

In fact, the research literature supports these findings by providing considerable evidence that a significant relationship exists between HLC orientation and health-related behaviors. For example, those with higher IHLC sought health information more actively (Wallston & Wallston, 1978), engaged in more health-promoting lifestyle activities (Ko & Hsu, 2005; Speake et al., 1991; Wallston & Wallston, 1978; Wang & Hsu, 1997), and avoided health-compromising behaviors (Norman et al., 1998). In contrast, as indicated in the previous research, elderly persons with strong CHLC did not take responsibility for their health behaviors, and consequently had poorer scores on all health-promoting subscales (Speake et al., 1989; Tuohig, 1991; Wardle et al., 1997). Finally, Wardle et al. (1997) stated that the PHLC was not significantly associated with health behaviors.

Effects of Selected Background Characteristics, Nutrition Self-Efficacy, and HLC on Nutritional Status

The study used hierarchical multiple regression to investigate predictive relationships between selected background characteristics, nutrition self-efficacy, and HLC for nutritional status. The predictive variables of nutritional status included the MNA scores and albumin levels. Most results were similar to those of other studies, either in Western countries or with Chinese elderly, in that age, educational level, health problems and medications, and CHLC were predictors of nutritional status in the elderly.

Nutritional Status of the MNA Score

The background characteristics of age, educational level, and health problems and medications were significant predictors of MNA scores (R^2_{adj} = .18, p < .01). Those results were consistent with other studies showing a relationship between aging and decreasing nutritional status both in Western countries (Keller & Hedley, 2002; Marshall et al., 2001) and among the Taiwanese elderly (Department of Health, 2004; Hsu, 2003; Lee, 2002). In regard to educational level and nutritional status, similarly to Wang (1999), the study showed that educational level was a predictor of nutritional health. This result indicates that elderly persons with higher levels of education may be more likely to obtain nutritional information and have greater motivation to engage in healthy eating than those with lower levels of education.

There is no doubt that health problems and medications is a significant predictor of nutritional status indicated by MNA score. As one's health condition worsens, it becomes a barrier to nutritional health (Callen & Wells, 2003; Gustafsson et al., 2002) in that poor health condition can lead to low appetite, malabsorption, and increased metabolism, all of which put the individual at nutritional risk (Eveleth et al., 1998; McCullough et al., 2002). Furthermore, prescription medications related to health problems may alter the appetite, with a reduction of nutrient intake severe enough to result in nutritional deficiency (de Jong et al., 1999; Lipschitz et al., 1992; Roe, 1985). Thus, the results of the study support arguments that chronic disease and polypharmacy are important factors affecting meal preparation and consumption.

Of the psychosocial factors, namely, nutrition self-efficacy and HLC (IHLC, PHLC, and CHLC), the only significant predictor of MNA scores was CHLC. Even after

selected background characteristics were entered into the equation, the CHLC contributed significantly and negatively to the prediction model (t = -3.35, p < .01). The finding was consistent with Zweiback's (2004) results showing that CHLC scores correlated less with effort to improve than PHLC scores or IHLC scores. Tuohig (1991) also indicated that people with CHLC were less engaged in a health-promoting lifestyle. In a study of the Chinese population, Wu et al. (2004) found that external HLC was a significant negative predictor of the participants' health status.

According to HLC theory, as the power of the elderly to affect the social, economic, and political spheres goes into decline, they increasingly relegate their locus of control to chance and powerful others, primarily because they must increasingly depend on assistance from others (Lachman, 1986). Unfortunately, persons with external control orientations believe that they are less likely to find available resources to avoid problems (Kist-Kline & Lipnickey, 1989). In particular, as Wong and Piran (1995) mentioned, the Chinese exhibit a greater tendency to believe that outcomes are ultimately the results of luck and fate. Informants in the qualitative portion of this study corroborated that important fact by their remarks within the *eating and faith* thematic category. Those results revealed that some Taiwanese elderly in this study accepted life events as natural processes. Consequently, they related their eating practices to their faith, that is, their reliance on God and fate, and tried to enjoy their later years as best they could. This lack of a proactive stance regarding healthy eating could represent a risk to nutritional health.

Nutritional Status of Albumin Levels

An interesting and innovative aspect of this study was the examination of predictive relationships in old age between a biological measure like albumin level, on

one hand, and selected background characteristics, nutrition self-efficacy, and HLC, on the other. Such studies are few and fragmentary in the literature. The results of this study showed that albumin level was only predicted by health problems and medications in the final model (R^2_{adj} = .06, p = .03); surprisingly, it indicated that those with a greater number of health problems and medications may have higher albumin levels. This finding is different from other studies which showed that participants with better health conditions had higher albumin levels (Chan et al., 1997; Chandra et al., 1991; Sonnenblick et al., 2007). As presented above, participants with health problems may realize the importance of their health, adjust to their health problems by eating appropriate foods. In addition, the effect of medications may also lead to more appropriate albumin levels, and using the number of chronic diseases only in the analysis instead of analyzing the type and the severity of health problems, may have led to difficulty in predicting the albumin levels accurately. However, the information regarding prediction relationships for albumin levels are limited; therefore, an indepth analysis is suggested for further research.

The results of this study revealed that no psychosocial factors, that is, nutrition self-efficacy or HLC, predicted the objective, biological indicator of nutritional status (F [4, 146] = 1.57, $p > .05$). This finding was also different from that of Marcellini, Giuli, Papa, Malavolta, and Mocchegian (2006), in which serum albumin and psychological characteristics within an elderly population were significantly related.

Some issues were identified regarding the prediction of albumin levels by nutrition self-efficacy and HLC. First, as Keller (1993b) cautioned, the use of albumin levels in the study of elderly persons is controversial, because such attempts may lead to

oversimplifications of malnourished states. In addition, albumin levels are slow to reflect changes in nutritional status (Chandra et al., 1991; Guigoz et al., 2002; Vellas et al., 1999) since they have a half-life of 21 days (DiMaria-Ghalili & Amella, 2005). Because psychosocial factors like nutrition self-efficacy and HLC change over time, it is difficult to establish a predictive relationship between those factors and albumin levels. Second, as mentioned previously, the elderly sample in this study was generally healthy, so that the range of albumin levels was narrow (from 3.4 to 4.5 mg/dl) with a little negative skewness (-.02). This small variation in albumin levels may have been a factor against finding a significant predictive relationship among this variable and others.

Issues Regarding Prediction Relationships

Small effect size. One note of caution is that the overall amount of the variance accounted for by the predictors was quite small, especially in albumin levels (6%). When the formula of $f^2 = R^2/1\text{-}R^2$ was used in the current study to calculate effect sizes, the effect sizes were .47 for the MNA score and .06 for albumin levels. Those values are smaller than those of some population effect sizes closely related to this study (f^2 = .11 to .61; see Table 1). Hence, the variables in the model explained less variance than was suggested by the literature, particularly that for albumin levels. Again, it is possible that the sample in this study was generally healthy; therefore, there was not enough variability in the scores to correlate well with both nutritional status measurements. Moreover, the small amount of variance explained by the regression model may also indicate that unmeasured factors account for most of the variance in nutritional status, especially that for albumin levels.

Prediction power of nutrition self-efficacy. The most noteworthy finding in this study, one that differed from findings in the literature, was that nutrition self-efficacy was not a significant predictor of nutritional status. The results did not indicate that the stronger the participants believed in their capabilities, the greater and more persistent would be their efforts, as suggested by Bandura (1989). In other studies, self-efficacy has repeatedly been a good predictor of health behavior and nutritional outcomes, sometimes explaining 30% to 50% of variability (Chen, 1999; Conn, 1997; Greene et al., 2004; Martinelli, 1996; Matheson et al., 1991; Rimal, 2000).

As discussed in Chapter 3, two issues regarding this result may need to be considered: the aging process and the culture. People growing old tend to lower their self-efficacy as they observe negative events and processes affecting their peers, and health conditions worsen in old age (Abu-Bader et al., 2002; Goldsteen et al., 1995). Moreover, the collectively oriented Chinese culture may inhibit the development of self-efficacy (Mau, 2000). In the qualitative portion of the current study, some participants expressed this construct less frequently than others. Although some of the elderly were aware of the need for healthy eating as they aged, other participants indicated that they treated health as a natural process in their lives. The major thinking in this sample was that only God and fate could control the health of the participants, while the participants' task was to enjoy life as best they could. From this reasoning, it could be deduced that aging and culture lowered the level of nutrition self-efficacy, and the confidence of a Taiwanese elderly person that he or she could adopt healthy eating practices may not be a good predictor of nutritional status.

Although nutrition self-efficacy failed to yield a significant prediction of nutritional status in this study, it has been recognized as an important factor in nutritional outcomes. As discussed previously, the reason for that result may be that the elderly population in this study was generally healthy, and further study is suggested to explore the perdition relationship between nutrition self-efficacy and nutritional status among population of diverse ages.

Eating Patterns among the Taiwanese Elderly

The responses to the short-answer question were subjected to a content analysis, and three categories were identified: *eating and old age*, *eating and faith*, and *eating and family harmony*. This section discusses those qualitative results, both generally and specifically, in relation to other research.

Eating and Old Age

The current study suggested that the eating patterns in old age included attempts to achieve good health by being aware of what constitutes healthy eating, active dieting (that is, adjusting food intake to meet health problems), and upholding old customs regarding food and eating.

Achieving good health. Participants stated that they ate to stay healthy in their later years. A number of investigations have claimed that older people are more motivated to adopt healthy eating behaviors than younger people (Callen & Wells, 2003; Ernyhough et al., 1999; Wang, 1999). Likewise, in a more recent study investigation, McGuire, Strine, Okoro, Ahluwalia, and Ford (2007) found that older adults tend to engage in healthier lifestyle behaviors than younger people do. Nehrke, Hulicka, and Morganti (1980) argued that the elderly appear to have adequately resolved any crises

they may have had between ego integrity and despair, even though they may live on in what has often been viewed as sterile, blunting environments.

Most participants in this study stated that their reason for keeping healthy was to live independently and thereby reduce the burden on their children. On this point, Callen and Wells (2003) found that old people do well nutritionally, and they use creative problem solving to remain independent. Interestingly, one woman in the study indicated that her image of beauty had definitely affected her desire to eat healthy. Although appearance was not a concern mentioned more frequently than others, women, as expected, were more self-conscious of their appearance than men (Hayes & Ross, 1987), and women tended to have more negative body-images (Tsai, 1995). Hayes and Ross (1987) stated that, for some people, appearance is as large a motivating factor in eating habits as is concern with health.

Adjusting to health problems. Health problems were often mentioned as a consideration in adopting eating patterns as the participant aged. Informants related that they adjusted to their health problems by eating appropriate foods. Many participants followed an unwavering regime in order to "to keep me better." This finding was congruent with Wang's (1999) comment that, as the age of the individual increases, health problems make the person realize the importance of good health. Similarly, McGuire et al. (2007) stated that elderly people with chronic diseases are more likely than those without chronic disease to consider their health issues. The health problem most often cited by the participants was difficulty in chewing certain foods, which limited the participants' access to fresh fruits and vegetables eaten. Even so, they developed strategies to circumvent their dental problems and enjoy their food.

Upholding old customs. The participants discussed old eating customs and traditions quite enthusiastically and at great length. The participants identified three cultural aspects of their eating patterns. First, they valued traditional Chinese food, and they made no attempt to adopt any other cuisine as they grew older. The participants usually listed various types of traditional food they preferred. Interestingly, the elderly ate foods quite similar to those they ate when they were young, which suggested that the elderly had had the same dietary behaviors their entire lives. As one participant said, "I just eat what I can eat according to my old custom." A review of the literature indicates that the Chinese tend to be loyal to a long tradition of food consumption (Holroyd, 2002; Veeck & Burns, 2005). Even Chinese persons living in other countries prefer to prepare "Chinese-like" foods (Chau, Lee, Tseng, & Downes, 1990; Yang & Fox, 1979). Hoke, Timmerman, and Robbins (2006) also showed that many food preferences or habits established in childhood continued throughout the adult years. From those findings, it is clear that long traditions of food affect the dietary practices of this elderly sample.

Second, because of their historical backgrounds, the elderly participants practiced frugality in regard to eating. In the responses of many participants were memories of episodes in their childhood and early adulthood when they suffered from the lack of food. Those early memories paralleled events in history, such as the Japanese occupation of Taiwan, when hunger and even starvation were common. As the old Chinese saying goes, "Nothing is more important than eating (民以食為天)" (Newman, 2002), and in times of scarcity, people learn to respect their food by eating it in small amounts and never allowing themselves to waste it (Chan et al., 2002). In fact, the Chinese believe that overindulgence in food or drink is a sin. To this end, Chinese parents tell their children

that the ideal amount for every meal is *hci fen pao (七分飽)* (Newman, 1985). One response from a participant echoed this point: "I always follow our important rule for eating, called *hci fen pao*. To do this, I always have a small bowl for my meal."

Lastly, in the responses about traditional ways of eating, the principle of Yin and Yang was emphasized. A balance between Yin (cold) and Yang (hot) is an important principle of Chinese eating patterns. For example, when elderly persons have "weak blood," they should avoid an excess of *cold* foods and concentrate on increasing the *hot* components of their diets (Rux, 1982). This idea is congruent with comments from a participant in this study, who said, "We need to care about balancing the 'hot' and 'cold' foods to promote our health. Too hot or too cold is not good for the elderly since their blood is turning weak." Ludman and Newman (1984) showed that the principle of balancing Yin and Yang affects the dietary practice of the Chinese, even those who immigrate to other countries. Their study revealed that Chinese people living in the U.S. claimed they used Yin foods more frequently for fever and Yang foods more frequently for blood building. In addition, a study conducted by Chau et al. (1990) showed that approximately half the subjects balanced the *hot* and *cold* foods to promote their health using the theory of Yin and Yang.

Eating and Faith

Some people find peace of mind in the belief that eating is a matter of faith; that is, they believe that eating is subject to the will of God or to fate. People may also look upon aging as a natural process and take the view that their role is just to enjoy eating as best they can.

Depending on the God and fate. Some participants in this study emphasized that they did not care about eating healthy, because health was decided by God and depended on fate. Five informants believed that everything was already set up for us before we were born, and only God can control our fates. Consequently, people have no choice in staying healthy or not, regardless of their diets. This finding was consistent with that of a previous study that found religious-based preferences toward eating within an elderly Chinese population (Holroyd, 2002). Some people perceive health and disease as natural processes, and they take a fatalistic perspective in their approach to life events (Chen, 2001; Lu & Chen, 2002). In particular, the Chinese tend to believe that outcomes are due to luck and fate (Wong & Piran, 1995), and they believe further that illness or other mishaps are the result of bad luck or of bad deeds committed in a previous life (Nilchaikovit et al., 1993). Guo and Chiou (1997) highlighted the point that the most frequently used coping behaviors among the elderly were "accepting the situation as it is" and "letting things follow their natural cause."

The analysis in the current study showed that participants adopted some important strategies that involved appeals to God when they felt poorly. For example, they went to temples to pray and worship God, and they felt they received something objective from their temple visits that kept them healthy. This finding was similar to that from Holroyd's study (2002), which found that Chinese people sought relief from their ill health from all the Gods, or they selected one God for specific purposes. As Holroyd (2002) observed, because of the convergence of the variety of religious messages, a God or Gods are within the reach of the people and are more accessible to them than aid or advice from the government.

Enjoying later life. Older people, whether or not they have a disease, may think they have earned the "right" to indulge themselves after a lifetime of healthy eating and take the attitude that they should enjoy life while they can. A typical expression for this idea was offered by one informant: "When we get old, we don't need to care too much about how to eat. Just enjoy the food that you like it because the life is near the end." Sources of this sentiment may be the sense that elderly persons have a reduced influence over life events (Brothen & Detzner, 1983), observations of negative events (Goldsteen et al., 1995), and declining health (Abu-Bader et al., 2002; Goldsteen et al., 1995), any of which could affect their ability and motivation of elderly persons to engage in healthy eating.

Alarmingly, these fatalistic views regarding eating patterns and faith may have adverse effects on the nutritional health of elderly persons. Some beliefs expressed by the current sample of the elderly are especially noteworthy. For example, one male said that he gave up attempts to control his diabetes through his diet because he believed that Buddha would help him stay healthy. A female said that even when she took care of herself, if she was going to get sick, she would get sick, especially when she got older. Those attitudes were consistent with a quantitative finding from the study, namely, that most participants (82.7%) perceived that they did a poor or fair job in taking care of their nutritional needs. The strategies they adopted were to achieve peace of mind rather than to stay healthy. As Lin, Chen, and Huang (1997) mentioned, the elderly in Taiwan had pessimistic attitudes regarding nutrition, and they tended to ignore what they knew about eating for good health.

Eating and Family Harmony

Family values are as strong as religious beliefs for the Chinese. When the participants in this study explained their eating patterns during the interviews, they emphasized the importance of the family. Their comments in that regard, therefore, were labeled *eating and family harmony*, with two subcategories, *following the family eating rules* and *self-sacrificing for the family*.

Following the family eating rules. In regard to the family's role in the participants' eating patterns, fourteen participants consistently emphasized the importance of eating with their family. Eating with their families called upon them to conform to the family eating rules. The majority in this group mentioned that they accepted whatever food was prepared by their families, ate and liked the foods that the families liked, and sensed that fitting in with their families was a key component of wellness. The beliefs in the importance of family relationships may relate to Confucian principles, which dominate beliefs in Chinese cultures. Confucianism values loyalty to the family and a lack of self-centeredness (Chen, 2001). As Triandis (1989) observed, the central values in Chinese societies are conformity and the feeling of interdependence with one's family.

The informants stated that an important way to maintain good relationships with the family was by following the family eating rules. Two participants stated that nothing was more important than peaceful relationships among family members. This belief supported Veeck and Burns's (2005) idea that the Chinese tend to identify with their families, take care of their families, and maintain good relationships with their family members. Moreover, as Rux (1982) argued, food plays a central role in reaffirming the

cultural heritage of a group. Individuals develop a sense of belonging, a sense of "we-ness," fostered in part by the sharing of food during the period of identity formation.

Another factor that may be related to following the family eating rules is the elderly's dependence on their families. One elderly man, for example, said, "When we get older, we always have to depend on our families. I better get used to it, because now I am old, and I need a lot of care from my family." A participant in Lu and Chen (2002) mentioned the need "to raise the children in order to get care from them when I get older." For the Chinese, the home is a place where older persons can feel safe and rely on protection (Tang, 2000). That is why C. Chen (1996) suggested that elderly persons living with children turn out to be more dependent on children than the elderly as a whole.

Sometimes following the family eating rules has disadvantages for the elderly in their attempts to adopt food habits more appropriate to their age and health conditions. Because they have to eat what is available to them at home, they often have to do without their favorite foods. Moreover, because they value the rules of "keeping quiet" and "not having too many opinions when you get older," they do not openly engage in interpersonal conflicts. Based on the Chinese philosophy, conflict should be avoided if it would disturb the harmony between the person and the environment or among persons (Chen, 2001). Hence, they may ignore the needs of their own nutrition.

Self-sacrificing for the family. Elderly women more often gave first priority to the needs of their family members. The study revealed that elderly women felt that they had no choice but to devote themselves to their children and families. Informants frequently emphasized such notions as "My children's food and health are a priority. What I cook

everyday is for my family," and "I put my favorite foods aside for the needs of my family." This finding was congruent with that of Holroyd (2002), which showed that females consistently tried to do whatever was good for their families. Likewise, Veeck and Burns (2005) revealed that the Chinese tend to "take care of" and "please" their families, and they tried to preserve the identity of their families and the relationships among their members.

The study also found a gender difference in regard to self-sacrificing for one's family. The Chinese culture background may yield a proper explanation for that difference. In the patriarchal Chinese society, rather than look after themselves, women are expected to care for, feed, and nurture the other family members (Ma & Chan, 2003; Wolf, 1970). Therefore, for Chinese women, cooking is an intense social undertaking performed for the sake of others. Rux (1982) sheds light on this point by observing that the woman's traditional role as the preparer of food gives her a sense of participation in the maintenance and continuation of the culture. Consequently, the preparation of meals becomes a part of the gender role for women, a role that also requires them to do the shopping for their families. Paradoxically, the one who prepares the meals, that is, the mother, plays only a secondary role in the larger family affairs.

The cultural background requires a closer look. In Taiwan, a good woman is above all else a responsible wife and mother for the husband and children and a caregiver for the entire family. Tai and Tam (1997) showed that Taiwanese women were more influenced by Confucianism than were women in Hong Kong. The Taiwanese philosophy of living puts emphasis on the family system, so that the women are more family oriented and feel a strong sense of family responsibility. For that reason, the woman sacrifices her

personal interests if they do not benefit the family as a whole (Chen, 2001). Even when females become old, the grounds for their sense of self-worth still lie within their families and society (Shu, Huang, & Chen, 2003). On the other hand, Shu et al. (2003) found that Chinese women in patriarchal families lead very hard and secluded lives as they devote themselves entirely to the well-being of their families. While it is obvious that Taiwanese women strongly identify with the symbolic roles of women in Chinese tradition, it is they who shoulder all the responsibilities of house work.

In short, the results of the qualitative part of the study indicate that elderly people adopt eating patterns not only focused on their health condition, but also in keeping with their faiths and the need to preserve family harmony. For them, eating is not just a matter of food, but also a matter of religion, family, and the meaning of their lives. Although one of the eating-pattern categories identified by the participants, namely, *eating and old age*, included beliefs that helped them maintain good nutrition, the other two categories, *eating and faith* and *eating and family harmony,* may include behaviors that adversely affect nutritional outcomes for this population. Additional research is needed to examine gender differences and pessimistic or passive attitudes toward eating. The literature, however, lends support for the research findings in the current study, and the fundamental categories and subcategories identified in this study are also evident in other studies. Thus, this research supports and contributes to an understanding of the eating patterns in the elderly population living in Taiwan.

Theoretical Considerations

As a basis for understanding the factors that influence the nutritional status of the Taiwanese elderly, a theoretical framework for the study was grounded on two theories:

self-efficacy theory and HLC theory (see Figure 1). The framework suggested that selected background characteristics, nutrition self-efficacy, and HLC were all related to the nutritional status of the elderly. In general, the study results at least partially supported those premises.

The overall amount of predicted variance in nutritional status accounted for by the predictors was quite small. There may be some important factors that should be included in the framework. First of all, HLC, which includes IHLC, PHLC, and CHLC, was hypothesized to predict behavior outcomes. The results, however, showed that only CHLC had an effect on the nutritional status indicated by MNA scores. Hence, the hypothesis was partially supported. The qualitative findings indicated that religion and Chinese philosophies were dramatic influences on the eating patterns of the Taiwanese elderly. Because it is obvious that religion plays a central role in the eating preferences of some elderly persons, the addition of fourth HLC orientation seems appropriate, namely, God health locus of control (Wallston et al., 1999), which would help build a new understanding of the relationships between control beliefs and behavior outcomes among the Taiwanese elderly.

Second, Wallston et al. (1976) have contended that the types of HLC orientation cannot by themselves strongly predict healthy-behavior outcomes. Instead, researchers should also consider such factors as the degree that a person values good health. The literature review indicated that the value one places on good health is a determining factor of control belief (Kist-Kline & Lipnickey, 1989; Liou & Contento, 2001). As Wallston et al. (1976) stated, an individual who values a healthy life and feels in control of his or her own health (internal) will seek more health information than those with

internal control who do not value a healthy lifestyle or those with external control who do or do not value a healthy lifestyle. Therefore, the authors contended that only people who place high value on good health actually adopt healthy behaviors. Hence, future research could add another variable, health value, to the theoretical framework.

Third, the family was hypothesized to be a predictor of nutritional status in the Taiwanese elderly. The results of the current study, however, showed that living arrangements was not a significant predictor of the nutritional status whether the indicator MNA scores or albumin levels. The family has been identified as a key resource from which individuals develop their healthy eating patterns in their old age (Chan, 2000; Hsu et al., 2003; Lee, 2004; Tsai et al., 2004; Wang, 1999). Living arrangements were conceptualized not only in the traditional sense of a family, but also in the broader sense of a social unit in which the individual is recognized as a significant member. Moreover, the qualitative portion of the study found that the concept receiving most emphasis as an influence on the participants' eating patterns was the family. The current study, however, did not find a relationship between living arrangements and nutritional outcomes. There may be some important concepts that were not included in this study, for example, family roles and/or functions. Further research is suggested that investigates the relationship between family and elderly nutritional health in greater depth.

Finally, Rimal (2000) suggested that most health behaviors involve at least some degree of appropriate knowledge. For example, one study concluded that nutritional knowledge was highly related to nutritional status (Lin et al., 1997). Therefore, further explorations into the relationship between nutritional knowledge and other variables affecting the nutritional status of the elderly population may yield interesting results.

In summary, because no comprehensive conceptual models exist for the nutritional status of the elderly in Taiwan, a theoretical framework was developed to guide the current study. Some aspects of the theoretical framework were supported by the data, but other aspects of the framework need further evaluation. The data supported the use of background characteristics (age, educational level, health problems and medications) and CHLC as predictors of nutritional status. In further tests of the model, modify and add four other variables - health value, God HLC, family roles/functions, and nutritional knowledge - are suggested.

Strengths and Limitations

This study recruited participants by random sampling from two of ten Public Health Centers in Taiwan. Random sampling is a powerful sampling method because it reduces sampling bias and thus poses less threat to external validity (Trochim, 2001). In addition, face-to-face interviews were used to collect the survey data in this study. Such interviews represent a far more personal form of research than questionnaire surveys because the interviewer can work directly with the participants (Trochim, 2001). Therefore, it is a more appropriate approach for research focused on elderly Taiwanese who may be illiterate, visually impaired, or both. Finally, the data sets from both the quantitative and qualitative research were complementary in that together they gave a more complete picture than could have been obtained using either method used singly. Both of the methods not only added empirical data to the body of knowledge, but also included fresh perspectives on the elderly participants.

Along with those strengths, some limitations of the study must also be addressed. Those limitations relate to the generalizability of the study, its research design, and

measurement issues. First, for several reasons, the findings of this study cannot be generalized to all Taiwanese elderly living in community-dwellings. The small, randomly selected sample was composed of mostly healthy persons, was primarily male, was characterized by a generally high nutritional status, and was selected from only one county in Taiwan. Thus, the participants may have had eating patterns that were different from those of other randomly selected groups of elderly. Moreover, the elderly living in Yilan County had more agriculturally oriented lifestyles. Any generalization of the results from this study, therefore, should be limited to elderly persons living in the rural areas of Taiwan.

Second, the cross-sectional nature of the data does not allow examination of causal relationships. Because nutritional status is a condition that changes over time, a longitudinal design would have been more appropriate for this study. In regard to the qualitative approach, other limitations should be noted, (a) Data collection was limited to those informants who were willing and able to share personal information about how they ate. Other elderly in this study or from the community might have given different opinions. (b) The informants were interviewed only once; thus, a saturation of qualitative data was not achieved. Consequently, some phenomena relevant to diet behavior may have been overlooked. (c) Because the subjects were interviewed shortly after completing the quantitative part, the repeated exposure to measures and fatigue effects may have influenced their answers. (d) The findings were not shared with and verified by the informants. Because of those shortcomings, further qualitative research is necessary to gain a deeper understanding of the attitudes toward nutritional behavior among the Taiwanese elderly of various social and cultural backgrounds.

Finally, the researcher also recognized the limitations associated with self-reporting. The collection of survey data from older adults is particularly susceptible to certain biases. As Taylor-Davis and Smiciklas-Wright (1993) reported, inaccurate responses from elders are often attributable to misinterpretation of the question, lack of motivation to answer accurately, and memory performance.

In respect to misinterpretation, for example, 12 participants in this study had difficult in understanding the difference between "how much confidence do you have about performing it" and "how good a job you feel you are doing in taking care of your health eating?" On the other hand, they had difficulty distinguishing between rating something they had already done and rating their confidence in doing something in the present. As Taylor-Davis and Smiciklas-Wright (1993) observed, the elderly are more likely to base their response on past performances and old beliefs than on ongoing or recent behavior.

Another bias in this study associated with measurement is that, when subjects have had repeated exposure to measures, they may become bored and lose their motivation to answer accurately (Munro, 2005; Taylor-Davis & Smiciklas-Wright, 1993). For example, some of participants in this study refused to say more about their eating patterns when they began to tire. As one subject said, "It would take too long for me to tell all about my food intake. May I meet you some other day and then I'll have more energy for talking?"

Memory also imposes a challenge to this elderly sample. For example, three items in the MNA scale ask the participants to report their nutritional status during the last three months (Items A, B, and D). Some elderly had difficulty recalling their nutritional status.

Thus difficulty in remembering, however, is not surprising. For many elderly persons, the ability to recall is impaired (Ham, 1992; Madden, Goodman, &Guthrie, 1976). Most authors agree that the decreased short-term memory affecting the elderly may reduce the accuracy of information elicited by recall methods (Bowman & Rosenberg, 1982; Ham, 1992; Madden et al., 1976; McCormack, 1997). As Roe (1990) observed that some subgroups of elderly persons have a tendency to over-report food consumption instead of the amount of food actually consumed; therefore, the limitations of dietary recall may affect the trustworthiness of the MNA scale as a measure of nutritional status and lead to outcomes that are unrepresentative of the actual nutritional status.

Implications and Recommendations

The findings of this study have several implications for nursing practice, nursing research, and nursing education. Those implications and recommendations for future research are given in the following sections.

Nursing Practice

The nutritional status of elderly persons should not be ignored. Although no participant in this study was considered malnourished, 17.9% (n = 28) of the participants were found to be at risk of malnutrition. Therefore, making sure that the elderly receive regular nutritional assessments would be a first step in promoting the nutritional health of the older population in Taiwan. Second, nurses need to devote more time and attention to helping the elderly adopt healthy eating practices. The participants in this study were asked how they felt about the healthfulness of their eating patterns, and most (82.7%) perceived that they did a poor or fair job in taking care of their nutritional needs (see Appendix L). Moreover, the proportion of participants who reported that they had never

received any information at all about healthy eating was unusually high (n = 49). Alarmingly, only 15.4% of the participants said they had received information about healthy eating from nurses. Because researchers and experts have stressed that knowledge about nutrition is an important factor in improving the nutritional status of the elderly (Department of Health, 2004; Lee, 2002; Lin et al., 1997), the dissemination of nutrition information specific to the elderly should be an important function of gerontology nursing in Taiwan.

Although more research is needed prior to developing nutrition intervention programs, some general recommendations can be suggested. In designing the contents of nutritional intervention program, nurses need to highlight information in particular subject areas. For example, according to the CDSE scale, participants reported the lowest confidence in their ability to sustain healthy eating in the following areas: knowledge about how to eat, how to cook, how to select and purchase healthy foods, and how to control and maintain their ideal body weight. Moreover, the MNA scale showed that the elderly had lower scores for the management of their fluid and protein intake. Therefore, intervention programs should include ways to strengthen the nutrition self-efficacy of elderly persons and thus improve their ability to acquire healthy-eating skills and behaviors. Included in the programs should be instructions about fluid and protein intake.

Besides the nutritional interventions described above, other issues need to be addressed. For example, lower educational levels and externality were dominant features of the sample in this study, and the sample put great value on old customs and traditional ways of eating. Thus, easy, accessible programs are needed that are designed to help the elderly become aware of the effects of certain traditional perceptions and values on

healthy eating. Furthermore, the family plays an import role in elderly food intake. The responses in the eating and family harmony category indicated that daughters-in-law are the family members most frequently involved in diet preparation. Intervention programs should address the key family members, such as daughters-in-law, who are in a position to prevent nutritional problems and promote nutritional health. Lastly, some elderly tried to eat healthy because they said they wanted to achieve good health (n =19) or to adjust to health problems (n = 10). On the contrary, people may also look upon aging as a natural process and take the view that their role is just to enjoy eating as best they can (n = 25). Consequently, it is important for nurses to individualize and develop appropriate nutritional programs regarding their individual beliefs.

Nursing Research

Nursing research on the nutritional status of the elderly in Taiwan should be encouraged. A review of published articles in the National Central Library in Taiwan showed that fewer than 300 articles focused on nutrition, and, up to July 2, 2007, only 20 articles were related to nutritional issues regarding the community-dwelling elderly. The current study identified at least three promising areas for research into the nutritional needs of the elderly in Taiwan, as follows.

Regarding research design, holistic studies are needed that address the personal, psychological, and social factors affecting nutritional issues among the elderly in Taiwan. Because of the homogeneity of the sample and the general good health of the participants, there is room for research to duplicate this study but with a larger, more diverse sample of elderly persons. In regard to research methods, both quantitative and qualitative approaches are suggested. Such research, which would rely on both numerical data and

contextual data, would deepen our understanding of how the Taiwanese elderly eat. Although the current study used both quantitative and qualitative methods, the informants were interviewed only once using one open-ended question. Therefore, limited information about how eating patterns in the elderly develop was obtained. Further research is necessary to gain a deeper understanding of the attitudes of elderly Taiwanese toward healthy eating practices.

Experimental research that allows the manipulation of variables is necessary to further study. The qualitative results, however, gave evidence that some elderly eating patterns derived from the participants' faith in God or fate and on the participants' desire to enjoy life. Those passive approaches to eating issues may have effects on the participants' nutritional status. Therefore, further research is necessary to design intervention programs that can help elderly persons see the value of healthy eating and assume greater responsibility over their nutritional health. Although most experts agree that individuals with external beliefs are less likely to engage in positive health-related behaviors (Lee et al., 1985; Wallston & Wallston, 1978; Wong & Piran, 1995), Murphy et al. (2001) have argued that intensive and skillful dietary intervention can succeed whether or not clients bring strong IHLC to the healthy eating program. As Wallston et al. (1976) have stated, if the intervention programs are suited to the participants' control beliefs, then the relationship between HLC and health-related behaviors may not be as straightforward as it seems. For example, a self-directed program for internally oriented persons and a group-directed program for externally oriented persons have been recommended.

To recruit a sample, future research would need to focus on three populations. First, the research would have to address the high percentage of obese persons in the elderly population in Taiwan (from 20% to 26%; Department of Health in Taiwan, 2004; Hsu, 2003). The percentage of obese persons excluded from the current study was 18.19%. Researchers have argued that obese persons may have different eating patterns and psychosocial perspectives from those of their non-obese counterparts (Hoke et al., 2006), and therefore the elderly with obesity issues need to be addressed in future studies.

The elderly investigated in the current study lived in Yilan County, a rural area compared to other cities in Taiwan, and the population there has an agricultural lifestyle. According to the literature review, elders living in rural areas have more chronic diseases, less healthy lifestyles, less social and family support (Leung et al., 2002), and were more external oriented (Speake et al., 1991) in comparison with elders living in urban areas. Consequently, the health status and control beliefs of rural elders can be expected to be different from those of urban elders. However, the question of how locale affects nutritional health in elderly people needs further exploration, and it would be interesting to compare nutritional status and its factors among participants from both rural and urban areas.

Gender differences in nutritional status also need to be investigated. The current study showed that representation of male participants was unusually higher than representation of females (60.9 % vs. 39.1 %), and females had higher CHLC scores than males ($p < .05$). Moreover, according to the qualitative results, elderly women were more likely to sacrifice their own needs for the needs of their families. Those health attitudes and behaviors appeared to be associated with sex roles shaped by society and culture. As

Tsai (1995) noted, the gender differences in health attitudes and behaviors can be reduced by education and social policies. Furthermore, Timmerman (2007) observed that some women face numerous barriers to adopting healthy eating. For those reasons, both quantitative and qualitative studies are needed to explore how female nutritional issues compare with those of males.

Concerning measurement issues, for the reasons presented above, although the MNA tool was initially validated for relatively healthy elderly (Guigoz et al., 1996), its use in respect to health status and cultural differences requires additional studies and refinement for the community-dwelling elderly population in Taiwan. Moreover, some items presented in the CDSE scale are not appropriate when administered to the community-dwelling elderly living in Taiwan and may not address issues related to self-efficacy for healthy eating within the family. Therefore, revisions to the CDSE scale are required if it is to be administered to the Taiwanese elderly. Last, the finding of a relationship between health problems and medications and albumin levels are different from other studies. Surprising, increase number of health problems and medications were related to better albumin levels. One possible explanation is that using the number of chronic diseases alone can not correlate with albumin levels accurately. Hence, analyze both of type and severity of chronic disease are needed in further research.

Nursing Education

Nursing educators are challenged to teach students to be sensitive to elderly nutritional health. The outcomes of this study provide empirical information for nursing faculties to use in guiding students who have an interest in elderly nutritional health. For example, this study has provided new information about relationships among personal

factors, nutrition self-efficacy, HLC, and the nutritional status of the Taiwanese elderly. Thus, nursing faculty members can provide this new information to their students. Moreover, nursing curricula should include a component about building explanatory models so that students become practiced in their development.

The most noteworthy finding from this study was that the elderly followed old customs in their eating practices; in fact, culturally based food habits were very pronounced in this elderly sample. As Wheeler and Tan (1983) pointed out, most food practices do not develop haphazardly, but are guided by a set of concepts and beliefs. Nursing educators need to acknowledge and respect the eating habits of the elderly. Because the increasing number of older Taiwanese, it is important that nursing faculties and students gain a better understanding of the eating behaviors and attitudes of the older Taiwanese, and they must be sensitive to the influence of culture and family, as well as the special food needs of the elderly.

Last, the gerontology nutrition curriculum in Taiwan is limited. Most education programs teach nutrition in a general way by addressing, for example, nutrition and health. Nursing faculties need to recognize the special nature of elderly nutritional needs, and they should explore with students the differences and similarities of nutritional needs at different points in the human life cycle. It is difficult to promote elderly nutritional health if those distinctions are not understood. Therefore, making gerontological-nutrition curriculum available to students is essential to improving gerontology nursing in Taiwan.

Conclusion

This chapter has discussed the results of the study. Based on the research findings, the theoretical framework was evaluated, and some modifications were suggested for

further research. In addition, the chapter assessed how well the research design achieved its purpose and explained the limitations of the study. Finally, the implications of the results for nursing practice, nursing research, and nursing education were discussed, and recommendations for future studies were presented.

The current study used an integration of self-efficacy theory and HLC theory to help build an understanding of how elderly background characteristics, nutrition self-efficacy, and HLC relate to nutritional status in Taiwanese elderly persons. All concepts in the study were tested from multiple aspects. Clearly, there is an association between background characteristics, nutrition self-efficacy, and HLC on one hand and nutritional status on the other. Age, educational level, health problems and medications, and CHLC explained a portion of the variance in nutritional status as measured by MNA scores. For nutritional status as measured by albumin levels, the only significant predictor was health problems and medications. Moreover, the findings from the quantitative portion of the study are supported and complemented by the categories identified the written responses.

In Taiwanese research, however, no studies have explored these variables in a field setting. This study, therefore, serves as a preliminary step in developing interventions that can promote healthy-eating practices within this population. As the size of the elderly population in Taiwan increases, healthy eating within the elderly population will become a crucial issue. By outlining the multidimensional social and cultural factors affecting eating patterns, the findings of the study should encourage others to pursue additional research, and nutrition should receive a greater emphasis in the gerontology nursing in Taiwan.

APPENDICES

Appendix A: Human Subjects Approval Document

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FWA# 2030

Date: **03/27/07**

PI(s): **Su-Hui Chen** Department & Mail Code: **NURSING SCHOOL** **D0100**

Dear: **Su-Hui Chen**

IRB APPROVAL – IRB Protocol # **2007-03-0034**

Title: **The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly**

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board has reviewed the exempt status assessment of the above referenced protocol and found that it meets exempt approval under the category designated below for the following period: **03/27/2007** - **03/25/2008**

Any research involving surveys, interviews, or observation of children is not eligible for exempt review, unless it consists only of observational research where the investigator(s) do not participate in the activities being observed. Research that is FDA regulated cannot be granted an exemption except for category 6. (Research is FDA-regulated when it involves the use of a drug or medical device, other than the use of an approved drug or medical device in the course of medical practice, or when the results are to be submitted to or held for inspection by the FDA.) Unless otherwise required by Department or Agency heads, exempt research must fall within one of the following categories:

___1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as:
(i) research on regular and special education instructional strategies, or
(ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
(iii). The research is not FDA-regulated

_x_ 2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
(i.) Information obtained is recorded in such a manner that human subjects can be identified, directly or through

identifiers linked to the subjects: and
(ii.) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subject's financial standing, employability, or reputation; or
(iii.) The research involves surveys, interviews, or observation of children (where the investigator does not participate in the activities being observed);
(iv.) The research is not FDA-regulated

___3. Research involving the use of educational tests, survey or interview procedures, or observing public behavior that is not exempt under number 2 above, if the subjects are public officials or candidates for public office or a federal statute requires that the confidentiality of personally identifiable information will be maintained throughout the research and thereafter. The research is not FDA-regulated

___4. Research involving the collection or study of existing data, documents, records, pathological or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, either directly or through identifiers linked to the subjects. To qualify for exemption, the data, documents, records or specimens must be in existence before the project begins. The research is not FDA-regulated

___5. Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate; or otherwise examine:

i. Public benefit or service programs;
ii. Procedures for obtaining benefits or services under those programs;
iii. Possible changes in-or alternatives to those programs or procedures; or
iv. Possible changes in methods or levels of payment for benefits or services under those programs.
v. The program under study must deliver a public benefit (e.g., financial or medical benefits as provided under the Social Security Act or service (e.g., social, supportive, or nutrition services as provided under the Older Americans Act).
vi. The research or demonstration project must be conducted pursuant to specific federal statutory authority;
vii. There must be no statutory requirement that an IRB review the project;
viii. The project must not involve significant physical invasions or intrusions upon the privacy of participants;
ix. The funding agency must authorize or concur with this exemption.
x. The research is not FDA-regulated

___6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

__x__Please use the attached approved consent forms

____Waiver of Documentation of Consent

____Waiver of Informed Consent

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:

(1) Report immediately to the IRB any unanticipated problems.
(2) Proposed changes in approved research during the period for which IRB approval cannot be initiated without IRB review and approval, except when necessary to eliminate apparent immediate hazards to participant. Changes in approved research initiated without IRB review and approval to eliminate apparent immediate hazards to the participant must be promptly reported to the IRB, and reviewed under the unanticipated problems policy to determine whether the change was consistent with ensuring the participants continued welfare.
(3) Report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part.
(4) Insure that only persons formally approved by the DRC enroll subjects.
(5) If relevant to your study, please use only a currently approved consent form (remember approval periods are for 12 months or less).
(6) Protect the privacy and confidentiality of all persons and personally identifiable data, and train your staff and collaborators on policies and procedures for ensuring the privacy and confidentiality of participants and information.
(7) Submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change.
(8) Please note that this office will send out a reminder prior to the end of your approval period (typically at the end of the 12 months). At this time we will ask you to give us an update on whether the study is still in progress and/or has had any changes that need to be reviewed for approval.
(9) Notify the IRB and the DRC when the study has been completed and complete the Final Report Form.
(10) Please help us help you by including the above protocol number on all future correspondence relating to this protocol.

Thank you for your help in this matter.

Sincerely,

Jody L. Jensen, Ph.D., IRB Chair
Department of Kinesiology & Health Education
University of Texas Austin
Phone: 512-232-2685
Fax: 512-471-8914
E-Mail: JLJ@mail.utexas.edu

Appendix B: Permission Letter from Research Setting

Permission Letter from Research Setting

February 5, 2007
Su-Hui Chen, MSN, RN
Doctoral Candidate
The University of Texas at Austin
School of Nursing

Dear Ms. Chen:

Public Health Bureau Yilan County Government agrees that the researcher Su-Hui Chen, who is a Doctoral Candidate of The University of Texas at Austin, School of Nursing, has authority to implement her research, "The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly", at the Public Health Centers of Yilan County. Ms. Chen has permission to access health records to gather data on red blood cell, hemoglobin, albumin, globulin, cholesterol, and triglyceride levels, and to complete questionnaires for 250 elderly participants during the period from 1st April, 2007 to 31st August, 2007.

Sincerely

Liu Yi-Lien

Director-general
Public Health Bureau
Yilan County Government
No. 141, Shengjhe St.,
Yilan City, Yilan County 260,
Taiwan (R.O.C.)
TEL: +886393226311

收案同意書

敬啟者

研究人員：陳素惠 研究生

美國德州大學奧斯汀分校

護理學研究所

博士候選人

台端所申請於本局(宜蘭縣政府衛生局)所屬衛生所進行之研究計畫：「探討台灣老人飲食自我效能及健康控握信念與營養狀態之相關性」摘要書，業於民國 96 年 1 月 23 日經本局核閱。本局同意台端於民國 96 年 4 至 8 月期間，至本局所屬之衛生所進行年齡 65 歲(含)以上的社區老人 250 人之收案訪談工作，並經個案同意領取其本年度所進行"成人預防保健"健康檢查之血液檢驗結果，包括紅血球、血色素、白蛋白、球蛋白、膽固醇、與三酸甘油脂。

敬祝 學安

Appendix C: Consent Form

IRB APPROVAL: 03/27/2007 ***APPROVAL EXPIRES: 03/25/2008***

Title: The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly

Conducted By: Su-Hui Chen, RN, MSN, The University of Texas at Austin, School of Nursing, Doctoral Candidate, Telephone: 512-296-9453 (Austin), 093-209-9490 (Taiwan) sophee@mail.utexas.edu
Faculty sponsor: Gayle Acton, PhD, RN, CS, The University of Texas at Austin, School of Nursing. Associate Professor, Assistant Dean for Graduate Programs. Telephone: 512-471-9081. gayle.acton@mail.utexas.edu

You are being asked to take part in a research study. This form gives you with information about the study. The researcher will also describe this study to you and answer all of your questions. Please read the information below and ask questions about anything you don understand before deciding whether or not to take part. Your participation is entirely voluntary and you can stop taking part in the study without penalty or loss of benefits to which you are otherwise entitled. You can stop your participation at any time and your refusal will not influence current or future relationships with UT Austin or the public health center of your district. To do so just tell the researcher you wish to stop taking part in the study. The researcher will give you with a copy of this consent form for your records.

What is the purpose of this study?
The purpose of this research is to study the factors that are related to your nutrition. 135 community-dwelling Taiwanese elders will be recruited.

If you agree to be in this study, we will ask you to do the following things:
If you agree to take part, the data collection will be at a time convenient to you, and the researcher will ask you some questions shown follows:

- Your personal information: age, gender, educational level, living arrangement, and health condition
- How sure you are that you can choose, eat and fix healthy food
- The control you have over your health
- Assess your nutritional status, including looking at your health records to gather data on hemoglobin, albumin, and cholesterol levels from your 2007 health evaluation data sheet.

Total estimated time to participate in study is 30-50 minutes.

Risks of being in the study:
There are minimal discomforts and risk for participating in this study.

- You may feel tired or inconvenienced because of the 30 to 50 minutes needed to fill out the questionnaires. To avoid this, you will not be pressured to complete the questionnaires within a minimum time limit. You may ask to take a break if you need to rest.
- You may feel uncomfortable about answering some items. To avoid this, you can choose to not answer items that make you feel uncomfortable.
- You may be referred to a nutritionist. If so, the researcher will not be responsible for payment of the nutritionist fees.

If you wish to discuss the information above or any other risks you may experience, you may ask questions now or call the researcher listed on the front page of this form.

Benefits of being in the study:

- You may get nutrition information if you take part in this study.
- You may be referred to a nutritionist, if needed.
- Your participation will provide the valuable information for knowing the factors that related to Taiwanese elderly nutritional status.

IRB APPROVAL: 03/27/2007 ***APPROVAL EXPIRES: 03/25/2008***

Compensation: There is no compensation for you when you take part in this study.

Confidentiality and Privacy Protections:

- The data resulting from your participation may be made available to other researchers in the future for research purposes not detailed within this consent form. In these cases, the data will contain no identifying information that could associate you with it, or with your participation in any study.
- No direct or indirect identifiers will be used in connection with the data collected. Code numbers used will only serve to link all the pieces of data, but can not be used to link you with the information you provide.
- The records of this study will be stored securely and kept confidential. Only the official persons from The University of Texas at Austin, members of the Institutional Review Board, the researcher, and her adviser have the legal right to review your research records and will protect the confidentiality of those records to the extent permitted by law.
- All publications will exclude any information that will make it possible to identify you as a subject.

Contacts and Questions:
If you have any questions about the study please ask now. If you have questions later, want additional information, or wish to stop your participation call the researcher, Su-Hui Chen, conducting the study. Her name, phone number, and e-mail address are at the top of this page. If you have questions about your rights as a research participant, complaints, concerns, or questions about the research please contact Jody Jensen, Ph.D., Chair, The University of Texas at Austin Institutional Review Board for the Protection of Human Subjects at (512) 232-2685 or the Office of Research Support and Compliance at (512) 471-8871 or email: orsc@uts.cc.utexas.edu.

You will be given a copy of this information to keep for your records.

Statement of Consent:
I have read the above information and have sufficient information to make a decision about participating in this study. I consent to participate in the study.

Signature:_____ Date: _____

_____ Date: _____
Signature of Person Obtaining Consent

Signature of Investigator:_____ Date: _____

參與研究約定書

研究主題：
探討台灣老人飲食自我效能及健康控握信念與營養狀態之相關性

研究者資料：
陳素惠，美國德州大學奧斯丁分校，護理博士班學生
電話：512-296-9453 (美國)，093-209-9490 (台灣)。sophee@mail.utexas.edu
研究者指導教授: Dr. Gayle Acton, PhD, RN, CS, 美國德州大學奧斯丁分校，護理系副教授，電話：512-471-9081 (美國)，gayle.acton@mail.utexas.edu
您被邀請參與本校有關探討老人營養狀況之研究。這份研究約定書將向您說明整個研究的主要內容與研究者的聯絡資料，並回答您的問題。在您決定要不要參與這個研究前，請先仔細閱讀以下說明，或提出您對這個研究內容任何疑問或不清楚的地方。您是否參與本研究將是完全自願性的，您有完全的自由停止參與這個研究，只要將您的意願告知研究者即可。您的參與與否並不會影響目前或未來您與本校，及您與所屬衛生所之間的關係。研究者將提供一份本約定書的影本讓您保存，以便作為日後參考。

研究目的：
本研究主要目的為瞭解台灣老人的營養狀況及其主要的影響因素。為達此研究目的，本研究將會邀請至少135位社區老人參與。

參與本研究的過程：
若您有興趣參與本研究，研究者將會在您所屬的衛生所裡以面對面訪談的方式收集您的以下資料：

- 個人基本資料：年齡、性別、教育程度、居住安排、健康狀況
- 您對健康飲食的自信程度
- 您的健康控制觀念
- 您的營養狀況，包括在您的同意下讀取您於本年度所進行“成人預防保健”健康檢查之白蛋白檢驗結果。

參與研究所需時間：30至50分鐘。

參與本研究可能導致的不適：
本研究造成您的不適感的可能性極低。

- 您可能會對此訪談感覺疲憊，但您可以隨時要求休息以減低您的不適感。
- 有些問卷的題目可能讓您感覺不舒服，如果您有這種感覺，您有權不回答任何讓您感受不舒服的題目。
- 在評估您的營養狀況後會依您的需要而作適當營養方面的轉介，但轉介過程所需之費用研究者並不負擔。

如果您想多瞭解以上的問題，您可以馬上或以電話方式與研究者討論。

參與本研究的利益：

- 經由參與本研究您可以獲得營養的相關資訊。
- 在需要時幫您作適當營養方面的轉介。
- 您所提供的寶貴資料將可作為日後協助改善台灣老人營養狀況的重要依據。
-

參與研究的補償：

您的參與並無任何金錢上的補償。

您的隱私權：

- 本研究結果可能作為日後其他相關研究之參考。不論是應用在其他研究上或發表在學術性期刊，您的個人資料都會受到保護而不會外洩。
- 本研究的資料將會被保存於安全的地方。您的資料只有本校的人權審核委員會委員、本研究之研究主持人、和論文指導教授有權閱讀、並依法負責保護您的所有資料。
- 所有與本研究有關的發表都不會暴露您的個人資料。研究者於整個資料收集過程中也會提供您所有可能影響您參與本研究與否的資料。

聯絡方式：

如果您現在有任何與本研究相關的問題，您可以馬上提出與研究者討論。如果您之後有研究之相關問題、需要其他的相關資訊、或想中斷此研究，都請與研究者，陳素惠，聯絡。她的姓名、電話、與電子郵件信箱已呈現在上頁。如果您對您參與本研究的權益有疑問、或有任何的意見，您也可以與本校人權審核委員會主席，Jody Jensen聯絡：512-471-8871 (美國)，或電子郵件信箱：orsc@uts.cc.utexas.edu.

您將收到一份本約定書的影本以作為保存依據

對於本約定書的陳述：

我已閱讀或已瞭解上述的資料，並得到充份的資訊作為我是否參與本研究的依據。我同意參與本研究

簽名: _____ 日期: _____

_____ 日期: _____

負責解說本約定書者簽名

研究主持人簽名: _____ 日期: _____

Appendix D: Invitation Letter

Dear _____,

You are being invited to take part in a research project: The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly. My name is Su-Hui Chen. I am a doctoral student at The University of Texas at Austin, School of Nursing, USA. I hope to learn more about nutrition in Taiwanese elderly persons. The purpose of this research is to study the factors that are related to your nutrition. Your name was randomly selected from a list of names obtained from the _____ public health center.

To ensure that every step of the study is ethical and justified, the study has been approved by the Institutional Review Board for the Protection of Human Subjects at the University of Texas at Austin. Your participation in this study is confidential. Please be aware that you are not required to take part in this study and you may stop taking part in this study at any time without penalty or loss of benefits, and if you do not take part or stop taking part in this study, it will not in change current or future relationships with the _____ public health center.

You will receive a phone call from a nurse after you receive this letter. The nurse will give you more information about the study and answer any of your questions. She will invite you to take part in this study. The study consists of a one-time interview at the _____ public health center. It will take about 30-50 minutes and I will ask you questions about how sure you are that you can choose and fix healthy food, the control you have over your health, and I will assess your nutritional status. Also, I will ask you questions about your personal information, such as age, education, living arrangements, and health problems and medications.

Thank you for your assistance.

Sincerely,
Su-Hui Chen
Doctoral Candidate
The University of Texas at Austin
School of Nursing
E-mail: sophee@mail.utexas.edu
Phone: 512-296-9453 (Austin)
093-209-9490 (Taiwan)

研究邀請函

_____先生/女士：

我是美國德州大學奧斯汀分校，護理研究所博士班學生陳素惠。您被邀請參與“台灣老人飲食自我效能及健康控握信念與營養狀態之相關性”的研究計劃。為了能多瞭解台灣老人的營養議題，本研究的主要目的為探討台灣老人的營養狀況及其影響因素。您的姓名乃隨機由您所屬的_____衛生所所提供的老人名單中抽取而來。

為確保此研究的安全性與您的權益，本研究計劃已經本校-美國德州大學奧斯汀分校人權審核委員會的審查並通過。您的參與完全是自願性的，並且您的所有資料將以匿名方式處理，因此您的人權將會受到保護。除此之外您有權利在任何時間退出本研究，拒絕與退出研究並不會影響您的任何權益，也不會影響您與_____衛生所的關係。

在您收到此一邀請函後，您將會接到一位護理人員的電話，該護理人員將會向您簡要說明本研究、回答您想要知道與本研究相關的問題、並邀請您參與本研究。在您有興趣參與本研究時，該護理人員會在您的時間許可下與您約定一個與我在_____衛生所訪談的時間，此一訪談時間約需時30-50分鐘，並完成有關您健康飲食的自信程度、健康控制的觀念、與營養狀況的資料收集，同時我也會詢問您的個人基本資料，包括您的年齡、性別、教育程度、居住安排、與您的健康狀況。

謝謝您，並祝您 平安、健康

陳素惠
博士候選人
美國德州大學奧斯汀分校
護理研究所
E-mail: sophee@mail.utexas.edu
電話：512-296-9453 (美國), 093-209-9490 (台灣)

Appendix E: Telephone Text

Words in italics are for the nurse only for clarifying content.
Step one: Warm up and introduction
Hello Mr./Mrs./Ms _____. My name is _____. To learn more about Taiwanese elderly nutritional status and the influencing factors, I am calling and inviting you to take part in the research: The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in the Taiwanese Elderly. It will take 5-10 minutes for this call. Is it a good time for you to talk to me? ___Yes, ___No.
If the answer is "NO", find out if the participant: • *has no interest to participate this study, the participant's list is marked: "exclude". Nurse*: Thank you. Have a good day. Good-bye. •*does not have time to talk right now: find out the best day of week and time of day to call back.* Nurse: I will look forward to speaking to you again on ___ (day) at ___ (time). Have a good day. Good-bye. •*If the answer is "YES", go to step two.*
Step two: Make sure they received/understood the invitation letter
Nurse: Did you receive the invitation letter? •*If the answer is "NO", Nurse will read the original letter to the potential participant.* •*If the answer is "YES", Nurse:* there any parts you would like me to read or review with you? •*If the answer is "NO", the nurse will read the original letter to the potential participant.* •*If the participant received and understood the invitation letter, go to step three.*
Step three: Brief explanation of the study
The nurse will review a brief explanation of this study as follows: The purpose of this study is to study about Taiwanese elderly nutritional status and the influencing factors. At least135 community-dwelling elders will be recruited for this study. If you agree to take part in the study, a face-to-face interview will be scheduled at the _____ public health center, where the researcher will collect the data. The researcher will interview you and ask you questions about how sure you are that you can choose and fix healthy food, the control you have over your health and assess your nutritional status. Also, the researcher will ask you questions about your personal information, such as age, education, living arrangements, and health problems and medications. The researcher will also look at your health records to gather data on

albumin levels from your 2007 health evaluation data sheet. It will take approximately 30-50 minutes to complete the study.

After my explanation, would you like to learn more about the study? ___Yes, ___No.

• *If the answer is "NO", the participant's list is marked "exclude". Nurse:* Thank you. Have a good day. Good-bye.

• *If the answer is "YES", go to step four.*

Step four: Set up the interview time

May we set up the interview time in the _____ public health center on___ , time:___ . Is this time/date ok with you?

Please bring you prescription medications and your annual health assessment data sheet to this meeting.

Step five: End of phone call

Thank you for your assistance, and for taking part in this study. Do you have any questions or is there anything you would like to discuss before we hang up?

• *If the answer is "NO",* Thank you for taking the time to discuss the study with me, as your opinions is important to us. Have a good day. Good-bye.

• *If the answer is "YES",* discussion with the potential participant any issues they may wish to discuss.

電話訪談內容：

斜體字部份為護理人員專用，非溝通內容

步驟一：問候與簡介

_____ 先生/女士您好，我是：_____。為了瞭解台灣老人營養狀況及其影響因素，我很冒昧的打這個電話給您並誠摯的邀請您參與本研究。本研究名稱為：探討台灣老人飲食自我效能及健康控握信念與營養狀態之相關性。此一電話訪談約需5-10分鐘時間，請問您現在方便嗎？___方便 ___不方便。

如果個案的回答為"不方便"，則瞭解其原因為何。

•*如果個案對本研究沒興趣，則於個案名單上註明"不參與"並回答個案：*謝謝您，再見！

•*如果個案現在沒有時間可以交談，則與個案另約一個方便個案的時間：*我會在我們約好的___ 月 ___ 日 ___點再一次打電話給您，謝謝，再見！

•*如果個案回答為"方便"，則進行步驟二。*

步驟二：確認個案收到並瞭解研究邀請函

請問您有收到我們寄給的您的研究邀請函嗎？

•*如果個案回答"沒有"，則護理人員念一次邀請函內容讓個案瞭解研究概要。*

•*如果個案回答"有"，則護理人員詢問個案：*您看得懂邀請函的內容嗎？

•*如果個案回答"看不懂"，則護理人員念一次邀請函讓個案瞭解研究概要。*

•*如果個案收到並瞭解邀請函的內容，則進行步驟三。*

步驟三：簡要解釋研究內容

護理人員將對本研究作以下之簡要說明：

本研究目的在於瞭解台灣老人飲食自我效能及健康控握信念與營養狀態之相關性。為達本研究目的，本研究將邀請至少135位社區老人參與本研究。如果您對本研究有興趣，我們會安排您與主要研究者在_____衛生所進行面對面的訪談。訪談中研究者將會收集您的個人基本資料、您對健康飲食的自信程度、您的健康控制觀念、與您的營養狀況，並在您的同意下讀取您於本年度所進行"成人預防保健"健康檢查之白蛋白檢驗結果；約需花費30至50分鐘完成訪談及資料的收集。

經由我的解說之後，您是否有興趣參與本研究？___有 ___沒有。

•*如果個案回答"沒興趣"，則於個案名單上註明"不參與"並回答個案：*謝謝您，再見！

•*如果個案回答"有興趣"，則進行步驟四。*

步驟四：擬定訪談時間

我們約定您於____月____日____點，在_____衛生所與研究者進行面對面的訪談。請問這個時間您方便嗎？並請您攜帶您所有的藥物及本年度健康檢查之血液檢驗結果。

步驟五：結束

感謝您的合作與對本研究的興趣，在我們結束通話前，您還有任何想討論的問題嗎？

•*如個案回答"沒有"，則護理人員回答：*謝謝您寶貴的時間，您的意見對我們而言相當重要。再見。

•*如個案回答"有"，則護理人員將與個案繼續討論其關心的問題。*

Appendix F: Permission Letter for Using the Instruments

1. Permission Letter for the CDSE Scale

Date: Tue, 14 Mar 2006 10:06:36 -0500
From: "Nichols, Erin" <ENICHOLS@PARTNERS.ORG>
To: sophee@mail.utexas.edu
Subject: RE: About the scale of "cardiac diet self efficacy"

Hello Su-Hui,

I have spoken to Dr. Hickey and she is fine with your request to translate the scale as outlined below. Best of luck in your continued research!

~Erin Nichols

-----Original Message-----
From: sophee@mail.utexas.edu [mailto:sophee@mail.utexas.edu]
Sent: Sunday, March 12, 2006 1:46 PM
To: Nichols, Erin
Subject: RE: About the scale of "cardiac diet self efficacy"

Dear professor Hickey,
My name is Su-Hui Chen. I am a PhD student in the University of Texas at Austin, School of Nursing. I am interesting in investigating the relationship between eating self-efficacy and nutritional status for Taiwanese elderly; therefore, I had been discussed with you about the scale of "Cardiac Diet Self-Efficacy, the CDSE", and I found that the CDSE contents fit to my target population. I begin working on my dissertation study of "The Relationships among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in Taiwanese Elderly". And I will start my pilot study in this summer and will do my dissertation in next spring. Therefore, I plan to translate your instrument of CDSE to Chinese and to use it in my pilot study and my dissertation research. May I have the honor to get your permission about translating this instrument and using it in my pilot study and dissertation?
Sincerely,

Mar/12/06
Su-Hui Chen
Doctoral student
The University of Texas at Austin
School of Nursing
1700 Red River
Austin, TX, 78701
My cell phone: 512-296-9453

Date: Mon, 16 Oct 2006 09:13:07 -0400
From: "Lafleur, Jennifer" <JLAFLEUR@PARTNERS.ORG>
To: sophee@mail.utexas.edu
Subject: RE: For the instrument of CDSE

Good Morning Su-Hui,
I forwarded Mairead your email and attachment and Mairead stated that everything looks fine and you have her OK.
Thank you Su-Hui,
Jennifer

----- Original Message -----
From: sophee@mail.utexas.edu
Sent: Sun, 24 Sep 2006 22:42:08 -0500
To: "Dr. Hickey" <mhickey@partners.org.>
subject: For the instrument of CDSE

Dr. Hickey,
My name is Su-Hui Chen, a PhD student in the University of Texas at Austin, School of Nursing. I had been tried to contact with you and get your feedback for my translation issue of the CDSE by e-mail, did you get it? May be your time is limited, I would like to explain again and attach my translation result.
Because I am interesting in investigating the relationship between eating self-efficacy and nutritional status for Taiwanese elderly persons, I had been contacted with you and requested to translate the "cardiac diet self-efficacy" scale (the CDSE) for my population. I took a long time to go through the process of translation and back-translation. Therefore, I got the two version of the CDSE: the original version and the back-translation version. Based on the translation model, both of them should be identical. Therefore, please take a look and give me some feedback. Thank you.
Sincerely,

Su-Hui Chen
Doctoral student
The University of Texas at Austin
School of Nursing
1700 Red River
Austin, TX, 78701
My cell phone: 512-296-9453

2. Permission Letter for the MHLC Scale

Date: Wed, 5 Apr 2006 18:32:04 -0500
From: "Wallston, Ken" <ken.wallston@Vanderbilt.Edu>
To: sophee@mail.utexas.edu
Subject: RE: For MHLC permission

Ms. Chen:
The MHLC scales are "in the public domain" which means that you do not need my permission to use them in your research. You do, however, have my blessings.

Please go to http://www.vanderbilt.edu/nursing/kwallston/mhlcscales.htm
for copies of the scales and for further information about them.

Happy Chinese New Year to you, too.

Ken Wallston

-----Original Message-----
From: sophee@mail.utexas.edu
Sent: Saturday, February 04, 2006 11:25 AM
To: Wallston, Ken
Subject: For MHLC permission

Dr. Wallston,
I am a Ph.D. student and studying in nursing of the University of Texas at Austin. I am interesting in the issue of elderly especially for the relationship between nutrition and their health locus of control. Therefore, I reviewed the literature and I found that the MHLC will fit in nicely with my program of study. But I have no idea for getting the permission of the MHLC for my pilot testing and dissertation. Therefore, would you please give me more detail information for that? Thanks so much, and HAPPY CHINESE NEW YEAR!
Sincerely,

Su-Hui Chen
The University of Texas at Austin, School of Nursing
1700 Red River, Austin, Texas 78701-1412
Phone: 512-296-9453

Dear Su- Hui Chen,

You have my permission to use the Chinese version of "Multidimensional Health Locus of Control scale" in your pilot testing and dissertation research, and to do any modification according to the result of your pilot investigating.

Sincerely,

Lian-Hua Huang, RN, MSN, EMBA, Ph.D.
Professor, School of Nursing, National Taiwan University
Deputy Superintendent, Taipei City Hospital
Mar/28/06

3. Permission Letter for the MNA Scale

Nestlé Nutrition

THREE PARKWAY NORTH, SUITE 500
P.O. BOX 760
DEERFIELD, IL 60015-0760

March 21, 2006

Su-Hui Chen
The University of Texas at Austin
School of Nursing
1700 Red River
Austin, TX 78701

Re: Permission to Copy

This responds to your request to copy the following Nestle materials:

- Publication title: **Mini Nutritional Assessment (MNA)**
  - For use in the publication entitled: **"The Relationship among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in Taiwanese Elderly"**

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Nestle USA, Inc.

By Carol Siegel

Agreed to and accepted by this 21st day of March, 2006:

Carol Siegel, MS, RD, LDN
Signature

Date: Wed, 26 Apr 2006 16:59:10 +0800
From: "Lee,Patricia,Taipei,HealthCare Nutrition" <Patricia.Lee@tw.nestle.com>
To: sophee@mail.utexas.edu
Subject: RE: MNA

Dear Su-Hui,

I have double confirmed with our legal department. Because you are far away, we agree you to use MNA form (Chinese version) in your research by this email.
Then, you can conduct the study in time.

Regards,
Patricia

-----Original Message-----
From: sophee@mail.utexas.edu [mailto:sophee@mail.utexas.edu]
Sent: Saturday, March 18, 2006 12:26 AM
To: "Lee,Patricia,Taipei,HealthCare Nutrition" <Patricia.Lee@tw.nestle.com>
Subject: Re: MNA

Dear Patricia,
My name is Su-Hui Chen. I am a PhD student in the University of Texas at Austin, School of Nursing. I am interesting in investigating the nutritional status in Taiwanese elderly; therefore, I had been discussed with you about the Chinese version scale of MNA, and I found that the Chinese version of the MNA contents fit to my target population. I begin working on my dissertation study of "The Relationship among Nutrition Self-Efficacy, Health Locus of Control, and Nutritional Status in Taiwanese Elderly". And I will start my pilot study in this summer and will do my dissertation in next spring. Therefore, I plan to obtain the Chinese version of MNA scale in my pilot study and my dissertation research. May I have the honor to get the permission about using this instrument in my pilot study and dissertation? Please tell me how the process for getting the permission. Thanks.
Sincerely,

Mar/17/06
Su-Hui Chen
Doctoral student
The University of Texas at Austin
School of Nursing
1700 Red River
Austin, TX, 78701

Appendix G: English Version of Instruments Package

1. Demographic Information Sheet

Participant ID #_____ , Site:_____ date: _____

____1	Date of birth:_____ age ( )
____2	Birth province: (1) Fukien (2) Hakkas (3) Mainlanders (_____ province) (4) other:_____
____3	Sex: (1) male (2) female
____4	Religious: (1) none (2) Buddhism (3) Catholic (4) Christian (5) folk religion (Taoism) (6) other: _____
____5	Marital status: (1) never married (2) married (3) cohabit (4) widowhood (5) separated (6) divorced
____6	Working status: (1) full time (2) part time (3) retired (4) housewife (5) other: ____
____7	Annual income: (1) from work or saving (2) wife/husband (3) children (4) grandchildren (5) subsidy from government (6) other: _____
____8	Does income enough to meet your living expenses? (1) yes (2) not sure (3) no, specify: _____
____9	Educational level: (1) no formal schooling (2) elementary school graduate (3) junior high school graduate (4) senior high school graduate (5) two or five-year college graduate (6) baccalaureate degree (7) master's degree or above
____10	You are: (1) illiterate (2) literate
____11	Living arrangement (indicate number)? (1) alone (2) with parent(s): ____ (3) with wife/husband (4) with brothers or sisters: ____ (5) with son: (6) with daughter: ____ (7) with son-in-law: ____ (8) with daughter-in-law: ____ (9) with grandchildren: ____ (10) with other relatives: ____ (11) with other (specify): _____
____12	Total live with _____ persons (except you)
____13	Meal accompanies (indicate number)? (1) alone (2) with parent(s): ____ (3) with wife/husband (4) with brothers or sisters: ____ (5) with son: ____ (6) with daughter: ____ (7) with son-in-law: ____ (8) with daughter-in-law: ____ (9) with grandchildren: ____ (10) with other relatives: ____ (11) with other (specify): _____
____14	Meal accompanies with ____ persons (except you)

____15 Food preparation and cooking: (1) by yourself (2) spouse (3) children (4) grandchildren (5) other: _____

16 Have you currently and / or ever been diagnosis with any of the following:

____16.1 -Cancer: (0) no; (1) yes, specify: _____, _____Years ago

____16.2 -Cerebrovascular disease: (0) no; (1) yes, specify: ____, _____Years ago

____16.3 -Heart disease: (0) no; (1) yes, specify: _____, _____Years ago

____16.4 -Diabetes mellitus: (0) no; (1) yes, specify: _____, _____Years ago

____16.5 -Respiratory disease: (0) no; (1) yes, specify: _____, _____Years ago

____16.6 -Renal disease: (0) no; (1) yes, specify: _____, _____Years ago

____16.7 -Liver disease: (0) no; (1) yes, specify: _____, _____Years ago

____16.8 -Hypertensive disease: (0) no; (1) yes, specify: _____, _____Years ago

____16.9 -Arthritis: (0) no; (1) yes, specify: _____, _____Years ago

____16.10 -Injury: (0) no; (1) yes, specify: _____, _____Years ago

____16.11 -Other: specify: _____, _____Years ago

17 Do you have difficulty with any of the following:

____17.1 -Chewing: (0) none (1) a little (2) some (3) a lot, specify:_____

____17.2 -Swallowing: (0) none (1) a little (2) some (3) a lot, specify:_____

____17.3 -Sense of taste and smell: (0) none (1) a little (2) some (3) a lot, specify:_____

____17.4 -Vision : (0) none (1) a little (2) some (3) a lot, specify:_____

____18 How many kinds of medications you take: _____, specify:_____

____19 Health status (by participant): (1) very poor (2) poor (3) fair (4) good (5) excellent

____20 Health status (by interviewer): (1)very poor (2) poor (3) fair (4) good (5) excellent

____21 Compared with one year ago, would you say that your health now is: (1) better (2) worse (3) about the same (4) don't know

____22 Diet education/counseling previously? (1) none (2) dietitian (3) physician (4) nurse (5) commercial group (6) family member (7) others: _____

____23 Overall, how good a job you feel you are doing in taking care of your health eating? (1) poor (2) fair (3) good (4) excellent

24 Albumin levels: _____ (Assessment date:_____)

25 Is there anything else you would like to tell me about your eating patterns?

_____

_____

_____

2. Cardiac Diet Self-Efficacy Instrument (CDSE)

Beside each item below, please circle how much confidence you have about performing it.					
1		2	3	4	5
Very Little			Confidence		Quite A Lot
1	2	3	4	5	1. Reaching my ideal body weight by eating healthy food.
1	2	3	4	5	2. Decreasing the amount of fat and cholesterol in my diet
1	2	3	4	5	3. Staying on a healthy diet when I am busy or in a rush
1	2	3	4	5	4. Staying on a healthy diet when no one at home is on it
1	2	3	4	5	5. Staying on a healthy diet when I eat at a restaurant
1	2	3	4	5	6. Staying on a healthy diet when I am not at home to eat
1	2	3	4	5	7. Staying on a healthy diet on special occasion or holidays
1	2	3	4	5	8. Knowing what foods I should eat on a healthy diet
1	2	3	4	5	9. Cutting out unhealthy snacks during the day or evening
1	2	3	4	5	10. Increasing the amount of fiber and vegetable in my diet
1	2	3	4	5	11. Staying at my ideal body weight once I have reached it
1	2	3	4	5	12. Knowing how to cook healthy meals
1	2	3	4	5	13. Preparing a healthy meal for myself when I eat alone
1	2	3	4	5	14. Limiting the number of egg yolks I eat in a week
1	2	3	4	5	15. Knowing what food to buy at the store
1	2	3	4	5	16. Decreasing the amount of sugar and sweets in my diet

3. Multidimensional Health Locus of Control (MHLC)

1 = STRONGLY DISAGREE (SD) 2 = MODERATELY DISAGREE (MD) 3 = SLIGHTLY DISAGREE (D)	4 = SLIGHTLY AGREE (A) 5 = MODERATELY AGREE (MA) 6 = STRONGLY AGREE (SA)					
	SD	MD	D	A	MA	SA
1. If I become sick, I have the power to make myself well again.	1	2	3	4	5	6
2. Often I feel that no matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3. If I see an excellent doctor regularly, I am less likely to have health problems.	1	2	3	4	5	6
4. It seems that my health is greatly influenced by accidental happenings.	1	2	3	4	5	6
5. I can only maintain my health by consulting health professionals.	1	2	3	4	5	6
6. I am directly responsible for my health.	1	2	3	4	5	6
7. Other people play a big part in whether I stay healthy or become sick.	1	2	3	4	5	6
8. Whatever goes wrong with my health is my own fault.	1	2	3	4	5	6
9. When I am sick, I just have to let nature run its course.	1	2	3	4	5	6
10. Health professionals keep me healthy.	1	2	3	4	5	6
11. When I stay healthy, I'm just plain lucky.	1	2	3	4	5	6
12. My physical well-being depends on how well I take care of myself.	1	2	3	4	5	6
13. When I feel ill, I know it is because I have not been taking care of myself properly.	1	2	3	4	5	6
14. The type of care I receive from other people is what is responsible for how well I recover from an illness.	1	2	3	4	5	6
15. Even when I take care of myself, it's easy to get sick.	1	2	3	4	5	6
16. When I become ill, it's a matter of fate.	1	2	3	4	5	6
17. I can pretty much stay healthy by taking good care of myself.	1	2	3	4	5	6
18. Following doctor's orders to the letter is the best way for me to stay healthy.	1	2	3	4	5	6

4. Mini-Nutritional Assessment scale (MNA)

NESTLÉ NUTRITION SERVICES

Nestlé

Mini Nutritional Assessment MNA®

Last name: First name: Sex: Date:

Age: Weight, kg: Height, cm: I.D. Number:

Complete the screen by filling in the boxes with the appropriate numbers.
Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe loss of appetite
1 = moderate loss of appetite
2 = no loss of appetite ☐

B Weight loss during the last 3 months
0 = weight loss greater than 3 kg (6.6 lbs)
1 = does not know
2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)
3 = no weight loss ☐

C Mobility
0 = bed or chair bound
1 = able to get out of bed/chair but does not go out
2 = goes out ☐

D Has suffered psychological stress or acute disease in the past 3 months
0 = yes 2 = no ☐

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems ☐

F Body Mass Index (BMI) (weight in kg) / (height in m)²
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater ☐

Screening score (subtotal max. 14 points) ☐☐
12 points or greater Normal – not at risk – no need to complete assessment
11 points or below Possible malnutrition – continue assessment

Assessment

G Lives independently (not in a nursing home or hospital)
0 = no 1 = yes ☐

H Takes more than 3 prescription drugs per day
0 = yes 1 = no ☐

I Pressure sores or skin ulcers
0 = yes 1 = no ☐

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals ☐

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yogurt) per day? yes ☐ no ☐
- Two or more servings of legumes or eggs per week? yes ☐ no ☐
- Meat, fish or poultry every day yes ☐ no ☐

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes ☐.☐

L Consumes two or more servings of fruits or vegetables per day?
0 = no 1 = yes ☐

M How much fluid (water, juice, coffee, tea, milk…) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups ☐.☐

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem ☐

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem ☐

P In comparison with other people of the same age, how does the patient consider his/her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better ☐.☐

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater ☐.☐

R Calf circumference (CC) in cm
0 = CC less than 31 1 = CC 31 or greater ☐

Assessment (max. 16 points) ☐☐.☐
Screening score ☐☐
Total Assessment (max. 30 points) ☐☐.☐

Malnutrition Indicator Score
17 to 23.5 points at risk of malnutrition ☐
Less than 17 points malnourished ☐

Ref.: Guigoz Y, Vellas B and Garry PJ. 1994. Mini Nutritional Assessment: A practical assessment tool for grading the nutritional state of elderly patients. *Facts and Research in Gerontology* Supplement #2:15-59.
Rubenstein LZ, Harker J, Guigoz Y and Vellas B. Comprehensive Geriatric Assessment (CGA) and the MNA: An Overview of CGA, Nutritional Assessment, and Development of a Shortened Version of the MNA. In: "Mini Nutritional Assessment (MNA): Research and Practice in the Elderly". Vellas B, Garry PJ and Guigoz Y, editors. Nestlé Nutrition Workshop Series. Clinical & Performance Programme, vol. 1. Karger, Bale, in press.

Appendix H: Chinese Version of Instruments Package

1. 個人基本資料

個案編號：_____ 收案地點：_____日期：_____

____1	年齡：_____ 足歲 (或出生年月日：_____ 年 _____ 月_____ 日)
____2	省籍：(1)閩南人 (2)客家人 (3)外省人(____省) (4)其他：_____
____3	性別：(1)男 (2)女
____4	宗教：(1)無 (2)佛教 (3)天主教 (4)基督教 (5)民間宗教 (6)其他：_____
____5	婚姻：(1)單身，從未結婚 (2)已婚 (3)同居 (4)鰥寡 (5)分居 (6)離婚
____6	職業：(1)全職 (2)半退休 (3)已退休 (4)家庭主婦 (5)其他：_____
____7	經濟收入：(1)工作收入或積蓄 (2)配偶 (3)子女 (4)孫子/女 (5)政府輔助 (6)其他：_____
____8	您目前的生活費足夠您的生活開支嗎？(1)足夠 (2)不確定 (3)不足夠:_____
____9	教育程度：(1) 未接受過正規教育 (2)小學 (3)國中 (4)高中 (5)專科 (6)大學 (7)碩士及碩士以上
____10	您是否識字：(1)不識字 (2)識字
____11	平常與誰一同居住(請說明人數)：(1)獨居 (2)父母：___ (3)配偶 (4)兄弟姊妹：___ (5)兒子：___ (6)女兒：___ (7)媳婦：___ (8)女婿：___ (9)孫子：___ (10)其他親友：___ (11)其他：_____
____12	同住人數共 (除本人外)：___ 人
____13	平常與誰一同進食 (請說明人數)：(1)自己 (2)父母：___ (3)配偶 (4)兄弟姊妹：___ (5)兒子：___ (6)女兒：___ (7)媳婦：___ (8)女婿：___ (9)孫子：___ (10)其他親友：___ (11)其他：_____
____14	平常一同進食的人共 (除本人外)：_____ 人
____15	平常由誰準備與烹調食物？(1)自己 (2)配偶 (3)子女 (4)孫子 (5)其他：_____
16	您是否過去或目前經醫師診斷有以下的疾病？
____16.1	-惡性腫瘤：(0)沒有；(1)有，_____，____ 年

____16.2 -腦血管疾病：(0)沒有；(1)有，_____，____ 年

____16.3 -心臟疾病：(0)沒有；(1)有，_____，____ 年

____16.4 -糖尿病：(0)沒有；(1)有，_____，____ 年

____16.5 -呼吸系統疾病：(0)沒有；(1)有，_____，____ 年

____16.6 -腎臟疾病：(0)沒有；(1)有，_____，____ 年

____16.7 -肝臟疾病：(0)沒有；(1)有，_____，____ 年

____16.8 -高血壓性疾病：(0)沒有；(1)有，_____，____ 年

____16.9 -關節疾病：(0)沒有；(1)有，_____，____ 年

____16.10 -外傷：(0)沒有；(1)有，_____，____ 年

____16.11 -其他：(0) 沒有；(1)有，_____，____ 年

17 您是否對以下四項功能感到困難？

____17.1 -咀嚼：(0)不會 (1)偶而 (2)會 (3)明顯，說明：_____

____17.2 -吞嚥：(0)不會 (1)偶而 (2)會 (3)明顯，說明：_____

____17.3 -味覺與嗅覺：(0)不會 (1)偶而 (2)會 (3)明顯，說明：_____

____17.4 -視覺：(0)不會 (1)偶而 (2)會 (3)明顯，說明：_____

____18 您目前所使用的藥物共_____種，說明：_____

_____

____19 健康狀況(個案自覺): (1)非常不好 (2)不好 (3)普通 (4)好 (5)非常好

____20 健康狀況(研究者評估)：(1)非常不好 (2)不好 (3)普通 (4)好 (5)非常好

____21 以整體健康而言您目前健康狀況較一年前為: (1)好 (2)差 (3)一樣 (4)不知道

____22 您曾經接受過飲食方面的教導嗎？(1)沒有 (2)營養師 (3)醫師 (4)護理人員 (5)商業組織 (6)家人 (7)其他：_____

____23 您認為自己在健康飲食方面的行為：(1)不好 (2)普通 (3)好 (4)很好

24 白蛋白檢驗值：_____(檢驗日期：_____月_____日)

25 您是否還有其他有關飲食方面的想法想要告訴我？

_____

_____

_____

_____

2. 飲食自我效能量表

請於以下1 至5 的分數中，圈選你所能做到的各項飲食行為的自信程度					
1 2 3 4 5 非常沒有信心 有信心 非常有信心					
問卷內容	評分				
1. 藉由健康的飲食來達到我的理想體重	1	2	3	4	5
2. 在我的飲食中減少油脂類與膽固醇的食物	1	2	3	4	5
3. 當我很忙或很急時也能維持健康飲食	1	2	3	4	5
4. 即使在家沒有人與我吃同樣的食物，我也能維持健康飲食	1	2	3	4	5
5. 當我在餐廳吃飯時也能維持健康飲食	1	2	3	4	5
6. 當我不在家吃飯時也能維持健康飲食	1	2	3	4	5
7. 我在特殊的場合或節日也能維持健康飲食	1	2	3	4	5
8. 知道什麼樣的食物是我應該吃的健康飲食	1	2	3	4	5
9. 不論白天或晚上都能不吃不健康的點心或零食	1	2	3	4	5
10. 在我的飲食中增加含有纖維質與蔬菜的食物	1	2	3	4	5
11. 一旦我達到我的理想體重也能維持它	1	2	3	4	5
12. 我知道如何去烹煮健康飲食	1	2	3	4	5
13. 當我獨自進食時也能為自己準備健康飲食	1	2	3	4	5
14. 我能限制每個禮拜所吃的蛋黃數量	1	2	3	4	5
15. 在商店時我知道去買什麼健康食物	1	2	3	4	5
16. 在我的飲食中減少糖與甜食的食物	1	2	3	4	5

3. 多層面健康控握信念評估表

評分方式：1＝ 非常不同意，2＝ 不同意，3＝ 不確定，4＝ 同意，5＝ 非常同意					
問卷內容	評分				
1. 假如我病了，我有能力使自己康復	1	2	3	4	5
2. 我常常覺得，無論我怎麼做，會生病就是會生病	1	2	3	4	5
3. 如果我定期看很好的醫師，我就比較不容易有健康的問題	1	2	3	4	5
4. 我的健康似乎經常受到一些意外事件的影響	1	2	3	4	5
5. 只有靠著醫護人員的幫忙，才能維持我的健康	1	2	3	4	5
6. 我對我的健康有直接的責任	1	2	3	4	5
7. 我是否健康或生病，受別人影響很大	1	2	3	4	5
8. 如果我的健康出現問題，那是我自己的疏忽所造成的	1	2	3	4	5
9. 當我生病時，我只能順其自然	1	2	3	4	5
10. 醫護人員可以確保我的健康	1	2	3	4	5
11. 當我擁有健康，是因為我的運氣好	1	2	3	4	5
12. 我身體的健康是依著我自己照顧得好不好而定	1	2	3	4	5
13. 當我不舒服時，我知道那是因為我沒有好好注意自己的身體	1	2	3	4	5
14. 病了能否康復是依我所得到他人的照顧與否而定	1	2	3	4	5
15. 即使我好好照顧自己，還是容易生病	1	2	3	4	5
16. 我若是生病，一切都是命中注定	1	2	3	4	5
17. 經由好好照顧自己，我就可以維持健康	1	2	3	4	5
18. 只有遵照醫生的囑咐才是維持我健康最好的方法	1	2	3	4	5

4. 迷你營養評估量表

Nestlé NUTRITION 雀巢營養服務中心

迷你營養評估紀錄單

姓名：_____ 性別：____ 出生日期： 民國: 前/後 ____年____月____日 日期:____年____月____日

體重（公斤）：_____ 身高（公分）：_____ 膝高度（公分）：_____

營養篩檢	分數
1. 過去三個月之中，是否因食慾不佳消化問題、咀嚼或吞嚥困難以致進食量越來越少? 0 分 = 嚴重食慾不佳 1 分 = 中度食慾不佳 2 分 = 食慾無變化	☐
2. 近三個月體重變化 0 分 = 體重減輕 >3 公斤 1 分 = 不知道 2 分 = 體重減輕 1~3 公斤 3 分 = 體重無改變	☐
3. 行動力 0 分 = 臥床或輪椅 1 分 = 可以下床活動或離開輪椅但無法自由走動 2 分 = 可以自由走動	☐
4. 過去三個月內曾有精神性壓力或急性疾病發作 0 分 = 是 2 分 = 否	☐
5. 神經精神問題 0 分 = 嚴重痴呆或抑鬱 1 分 = 輕度痴呆 2 分 = 無精神問題	☐
6. 身體質量指數(BMI) 體重(公斤)/身高(公尺)^2 0 分 = BMI < 19 1 分 = 19 ≦ BMI < 21 2 分 = 21 ≦ BMI < 23 3 分 = BMI ≧ 23	☐
篩檢分數 (小計滿分 14) ☐ 大於或等於 12 分: 表示正常(無營養不良危險性)，不需完成完整評估 ☐ 小於或等於 11 分: 表示可能營養不良，請繼續完成下列評估表。	☐☐
一般評估	**分數**
7. 可以獨立生活 (非住在護理之家或醫院) 0 分=否 ； 1 分=是	☐
8. 每天需服用三種以上的處方藥物 0 分=是 ； 1 分=否	☐
9. 褥瘡或皮膚潰瘍 0 分=是 ； 1 分=否	☐
10. 一天中可以吃幾餐完整的餐食 0 分 =1 餐； 1 分 =2 餐 2 分 =3 餐	☐

一般評估	分數
11. 蛋白質攝取量 •每天至少攝取一份乳製品(牛奶、乳酪、優酪乳) 是☐ 否☐ •每週攝取兩份以上的豆類或蛋類 是☐ 否☐ •每天均吃些肉、魚、雞鴨類 是☐ 否☐ 0.0 分 = 0 或 1 個是 0.5 分 = 2 個是 1.0 分 = 3 個是	☐.☐
12. 每天至少攝取二份或二份以上的蔬菜或水果 0 分=否 ； 1 分=是	☐
13. 每天攝取多少液體 (包括開水、果汁、 咖啡、茶、牛奶) (一杯 = 240 c.c.) 0.0 分 = 少於三杯 0.5 分 = 3 ~ 5 杯 1.0 分 = 大於 5 杯	☐.☐
14. 進食的形式 0 分 = 無人協助則無法進食 1 分 = 可以自己進食但較吃力 2 分 = 可以自己進食	☐
15. 他們覺得自己營養方面有沒有問題? 0 分 = 覺得自己營養非常不好 1 分 = 不太清楚或營養不太好 2 分 = 覺得自己沒有營養問題	☐
16. 與其他同年齡的人比較，他們認為自己的健康狀況如何? 0.0 分 = 不如同年齡的人 0.5 分 = 不知道 1.0 分 = 和同年齡的人差不多 2.0 分 = 比同年齡的人好	☐.☐
17. 臂中圍 MAC (公分) 0.0 分 = MAC < 21 0.5 分 = MAC 21 ~ 21.9 1.0 分 = MAC ≧ 22	☐.☐
18. 小腿圍 C.C. (公分) 0 分 = C.C. < 31 1 分 = C.C. ≧ 31	☐
一般評估 (小計滿分 16 分) 篩檢分數 (小計滿分 14 分) MNA 合計分數 (滿分 30 分)	☐☐.☐ ☐☐ ☐☐.☐
營養不良指標分數 * MNA 17~23.5 具營養不良危險性 ☐ * MNA <17 營養不良 ☐	

Appendix I: List of Experts for Instrument Translation and Evaluation

1. List of Experts for Translation and Back-Translation Instrument

Name	Information
Carol L. Delville	Doctoral Candidate, School of Nursing, The University of Texas at Austin.
Jung-Hua Shao	Doctoral Candidate, School of Nursing, Queensland University of Technology, Australia.
Li-Yu Chien	Assistant Professor, School of Nursing, Chang Gung Institute of Technology, Taiwan
Vickie L. Ragsdale	Doctoral Student, School of Nursing, The University of Texas at Austin.

2. List of Experts for Evaluation Instruments

Name	Information
Chien-Ling, Chiang	MS, RD, Clinical Dietitian, Department of Nutrition Therapy, Chang-Gung Memorial Hospital
Ching-Yu Cheng	Ph.D, RN Assistant Professor, School of Nursing, Virginia Commonwealth University
Shu-Fen Hsieh	MS, RD, Clinical Dietitian, Department of Nutrition Therapy, Chang-Gung Memorial Hospital
Wei-Fen Ma	RN, MSN, Ph.D, Assistant Professor, School of Nursing, China Medical University
Wen-Miao Liu	Doctoral Candidate, School of Nursing, The University of Texas at Austin.
Tsen-Men, Young	Professor, A member of the Board of Directors, Chang-Gung University

Appendix J: Supplement Findings of Data Analysis

Table J1

Background Characteristics of the Sample - Health Status (N = 156)

Items	*N*	*%*	*Mean*	*SD*	*Range*
Health status evaluated by participants			3.17	.81	1-5
Very poor	3	1.9			
Poor	27	17.3			
Fair	70	44.9			
Good	52	33.3			
Excellent	4	2.6			
Health status evaluated by researcher			4.03	.76	2-5
Very poor	0	0			
Poor	7	4.5			
Fair	22	14.1			
Good	87	55.8			
Excellent	40	25.6			
Health status comparison with last year			2.39	.68	1-4
Very poor	14	9.0			
Poor	70	44.9			
Fair	69	44.2			
Good	3	1.9			
Excellent	0	0			

Table J2

Background Characteristics of the Sample - Oral Heath (N = 156)

Items	*n*	*%*
Chew problem		
Yes	52	33.3
No	104	66.7
Swallow problem		
Yes	3	1.9
No	153	98.1
Taste and smell problem		
Yes	1	.6
No	155	99.4
Vision problem		
Yes	37	23.7
No	119	76.3

Table J3

Background Characteristics of the Sample - Healthy Eating Information (N = 156)

Items	*n*	*%*
Healthy eating information resources		
None	49	31.4
Dietitian	17	10.9
Doctor	66	42.3
Nurse	24	15.4
Family	21	13.5
Self learning	29	18.6
How good for healthy eating		
Poor	61	39.1
Fair	68	43.6
Good	20	12.8
Excellent	7	4.5

Note. A participant might have more than one healthy eating information resources

Table J4

Descriptive Statistics for the Items of the CDSE Scale (N = 156)

Scale	Item	*M*	*SD*	Item-total correlation
	Increasing the amount of fiber and vegetable in my diet	4.01	.71	.30
	Cutting out unhealthy snacks during the day or evening	3.96	.93	.24
	Staying on a healthy diet when I eat at a restaurant	3.92	.92	.32
	Limiting the number of egg yolks I eat in a week	3.85	.69	.27
	Staying on a healthy diet when I am not at home to eat	3.51	.91	.62
	Decreasing the amount of sugar and sweets in my diet	3.40	1.13	.32
	Staying on a healthy diet when I am busy or in a rush	3.38	.90	.48
	Staying on a healthy diet on special occasion or holidays	3.30	.87	.72
	Staying on a healthy diet when no one at home is on it	3.22	.91	.66
	Decreasing the amount of fat and cholesterol in my diet	3.10	1.11	.72
	Preparing a healthy meal for myself when I eat alone	3.06	.98	.76
	Knowing what foods I should eat on a healthy diet	2.86	1.13	.67
	Knowing how to cook healthy meals	2.62	1.04	.72
	Knowing what food to buy at the store	2.38	1.02	.60
	Reaching my ideal body weight by eating healthy food	2.22	1.08	.57
	Staying at my ideal body weight once I have reached it	2.19	1.22	.63

Note. The order of items was ranked from high to low of average item score. The range of this scale for each item was 1-5

Table J5

Descriptive Statistics for the items of the MHLC scale (N = 156)

Scale Item	*M*	*SD*	Item-total correlation
IHLC			
I am directly responsible for my health.	3.62	1.10	.83
I can pretty much stay healthy by taking good care of myself.	3.62	.77	.81
My physical well-being depends on how well I take care of myself.	3.58	.92	.85
When I feel ill, I know it is because I have not been taking care of myself properly.	3.50	.85	.83
Whatever goes wrong with my health is my own fault.	3.38	.90	.77
If I become sick, I have the power to make myself well again.	3.11	1.08	.71
PHLC			
Following doctor's orders to the letter is the best way for me to stay healthy.	3.92	.87	.84
If I see an excellent doctor regularly, I am less likely to have health problems.	3.85	.99	.76
I can only maintain my health by consulting health professionals.	3.78	.97	.78
Health professionals keep me healthy.	3.78	.92	.77
The type of care I receive from other people is what is responsible for how well I recover from an illness.	3.09	.68	.48
Other people play a big part in whether I stay healthy or become sick.	3.01	.79	.43
CHLC			
It seems that my health is greatly influenced by accidental happenings.	2.97	.79	.43
Often I feel that no matter what I do, if I am going to get sick, I will get sick.	2.88	.77	.51
Even when I take care of myself, it's easy to get sick.	2.84	.90	.53
When I stay healthy, I'm just plain lucky.	2.64	1.17	.70
When I become ill, it's a matter of fate.	2.59	1.19	.74
When I am sick, I just have to let nature run its course.	2.37	1.07	.19

Note. The order of items was ranked from high to low of average item score. The range of this scale for each item was 1-5.

Table J6

Descriptive Statistics for the Items of the MNA Scale (N = 156)

Scale Item	*n*	%	*M*	*SD*	Item-total correlation
Neuropsychological problems			1.99	.08	.20
0 = severe dementia or depression	0	0			
1 = mild dementia	1	0.6			
2 = no psychological problems	155	99.4			
How many full meals does the patient eat daily?			1.99	.11	-.08
0 = 1 meal	0	0			
1 = 2 meals	2	1.3			
2 = 3 meals	154	98.7			
Mobility			1.97	.16	.19
0 = bed or chair bound	0	0			
1 = able to get out but does not go out	4	2.6			
2 = goes out	152	97.4			
Mode of feeding			1.97	.21	.19
0 = unable to eat without assistance	1	0.6			
1 = self-fed with some difficulty	3	1.9			
2 = self-fed without any problem	152	97.4			
Lives independently			.97	.16	.19
0 = no	4	2.6			
1 = yes	152	97.4			
Mid-arm circumference (MAC) in cm			.96	.18	.26
0.0 = MAC less than 21	5	3.21			
0.5 = MAC 21 to 22	1	0.6			
1.0 = MAC 22 or greater	150	96.2			
Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?			1.88	.33	.40
0 = severe loss of appetite	0	0			
1 = moderate loss of appetite	19	12.2			
2 = no loss of appetite	137	87.8			
Pressure sores or skin ulcers			.94	.25	.15
0 = yes	10	6.4			
1 = no	146	93.6			
Takes more than 3 prescription drugs per day			.92	.28	.22
0 = yes	13	8.3			
1 = no	143	91.7			
Weight loss during the last 3 months			2.73	.66	.30
0 = weight loss greater than 3 kg	5	3.32			
1 = does not know	3	1.9			
2 = weight loss between 1 and 3 kg	21	13.5			
3 = no weight loss	127	81.4			

Table J6

Descriptive Statistics for the Items of the MNA Scale (N = 156) (Con.)

Scale Item	*n*	%	*M*	*SD*	Item-total correlation
Consumes two or more servings of fruits or vegetables per day?			.91	.29	.05
0 = no	14	9.0			
1 = yes	142	91.0			
Calf circumference (CC) in cm			.84	.37	.52
0 = CC less than 31	25	16.0			
1 = CC 31 or greater	131	84.0			
Body Mass Index (BMI)			2.51	.82	.23
0 = BMI less than 19	7	4.5			
1 = BMI 19 to less than 21	12	7.7			
2 = BMI 21 to less than 23	32	20.5			
3 = BMI 23 or greater	105	67.3			
Has suffered psychological stress or acute disease in the past 3 months			1.67	.75	.21
0 = yes	26	16.7			
2 = no	130	83.3			
Self view of nutritional status			1.40	.72	.25
0 = views self as being malnourished	21	13.5			
1 = is uncertain of nutritional state	52	33.3			
2 = views self as having no nutritional problem	83	53.2			
In comparison with other people of the same age, how does the patient consider his/her health status?			1.12	.70	.37
0.0 = not as good	17	10.9			
0.5 = does not know	35	22.4			
1.0 = as good	51	32.7			
2.0 = better	53	34.0			
How much fluid (water, juice, coffee, tea, milk…) is consumed per day?			.52	.45	.04
0.0 = less than 3 cups	53	34.0			
0.5 = 3 to 5 cups	49	31.4			
1.0 = more than 5 cups	54	34.6			
Selected consumption markers for protein intake:			.51	.34	.16
• At least one serving of dairy products • Two or more servings of legumes or eggs per week • Meat, fish or poultry every day					
0.0 = if 0 or 1 yes	33	21.2			
0.5 = if 2 yes	86	55.1			
1.0 = if 3 yes	37	23.7			

Note. The order of items was ranked from high to low of average item score.

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